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VOLUME 3, NUMBER 7, JULY 1972

Air Pollution Technical Information Center
Research Triangle Park, North Carolina

July 1972

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. The subject index consists of those terms that most clearly describe the information presented in the documents. The author index consists of personal authors which are arranged alphabetically.

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Vol. 3, No. 7 July 1972

Prepared by:
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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INTRODUCTION

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching—more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

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7. EFFECTS–HUMAN HEALTH

Covers medical and epedemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS–PLANTS AND LIVESTOCK

Effects on vegetation–crops, trees, other plants–and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS–MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractural activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

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ABSTRACT BULLETIN

EMISSION SOURCES

20049 APTIC NO. 38759

METALS IN FOREIGN COUNTRIES. INCREASING ACTIVITY ON METAL MARKETS. *(Metalle im Ausland. Zunehmende Belebung an den Metallmaerkten). Text in German. Metall (Berlin), 26(4):412-413. April 1972.*

The lead market was mildly active to active in the second half of February and the first half of March in Europe and particularly London. In the U. S. there was a lively demand for the metal. Lead producers were hardly impressed by an announcement that gasoline producers have to produce at least one type of lead-free gasoline beginning with July 1, 1974. At present, 1/10 of the world lead production is used for the manufacture of the anti knocking agent tetraethyl lead.

20050 APTIC NO. 38770

REFUSE COMBUSTION INSTALLATION IN BIEBESHEIM STARTS OPERATION. *(Verbrennungsanlage in Biebesheim nahm Arbiet auf). Text in German. Brennstoff-Waerme-Kraft, 23(11):473-474, Nov. 1971.*

A newly installed refuse combustion unit comprises a system of storage tanks of 750 cu m total capacity; a 25 cu m homogenizer in which calorific value and viscosity are adjustable; a 1.5-2.0 ton/hr combustion chamber (with a device for removal of semi-solid slags) for the incineration of oil sludges and old tires; a 2.0-3.0 ton/hr chamber for the combustion of inflammable liquids (used motor oils, oil emulsions, oil-water mixtures); a gas cooling unit; and an electrostatic dust separator which reduces the particulate content on the emitted gases to a maximum of 150 mg/cu m. The unit operates automatically and continuously and requires little supervision.

20051 APTIC NO. 38892

THE DISPOSAL OF SYNTHETIC WASTES. *(Vernichtung von Kunststoffabfaellen). Text in German. Oesterr. Ing. Z., 15(1):26-27, Jan. 1972.*

Synthetic refuse can be deposited without posing any danger to the groundwater. With a view to the increasing quantities, however, combustion of the waste material is to be preferred. Synthetics of polypropylene and polyethylene disassociate at combustion liberating carbon dioxide and water. Side effects harmful to plants or humans do not develop with the combustion of synthetics. As much as 40% of synthetics can be added to the refuse without disturbing the combustion process. The temperature in the combustion chamber must have a minimum of 800 C in order to destroy all odorous substances. Synthetics leave no residual matter at combustion.

20052 APTIC NO. 38893

FUEL OIL IS NOT AS BAD AN AIR POLLUTER. *(Kein Buhmann der Luftverschmutzung). Text in German. R.A.S. Rohr-Armatur- Sanitaer-Heizung, (4):155, April 1972.*

The quantity of carbon monoxide emitted annually in the Federal Republic of Germany is 7 million tons, while for sulfur dioxide it is 5 million tons. The percentage of carbon monoxide emitted by the burning fuel oil is negligible, however, it has to be mentioned that light fuel oil contains 0.4% sulfur. The fuel-oil producing industry succeeded in reducing the sulfur content from 0.7% to 0.4% in the last years and continues its research program concerning this problem.

20053 APTIC NO. 38903

PHILIPS ELECTRONIC FOR MEASUREMENTS AND CONTROL FOR BOAT ENGINES. *(Philips Elektronik fuer Mess-und Steuertechnik bei Schiffsmotoren). Text in German. Motortech. Z. (Stuttgart), 33(4):179-180, April 1972.*

At the exhibition of boats and engines in Hamburg, Philips displayed a measurement system for the waste gas temperature in the various cylinders of boat engines. The system comprises standard thermocouples. It is made of Cromel/Alumel because of the linear characteristic of the thermocouple and the necessary temperature range of up to 1000 C. The thermocouple voltages of the measurement points of the individual cylinders are passed to a central amplifier which forms a voltage corresponding to the average value of the temperature. This temperature is then compared to the voltages of the individual thermocouples.

20054 APTIC NO. 39137

ENVIRONMENTAL POLLUTION AND PLASTICS. *(La contaminacion ambiental y los plasticos). Text in Spanish. Plasticos, 19(112):144-148, Oct. 1971. 8 refs.*

Plastics constitute approximately 2.5% of the total incinerated city refuse. The most noxious variety among the plastics is polyvinyl chloride because of its chlorine content and because of its emission as hydrochloric acid upon combustion of PVC residues. Even though part of this HCl is neutralized by the alkaline components of the incinerated material, the remainder produces corrosion of stacks and pollutes the air. But, considering that PVC constitutes 0.3% of the total waste and that this amount is anticipated to reach 0.6% by 1980, the contribution of plastics to the overall air pollution should constitute no special concern. Total annual HCl emission from incineration can be considered as a 0.0005 part amount compared to 1.0, 0.8, 0.15, and 0.1 parts of carbon monoxide, sulfur dioxide, hydrocarbons, and nitrogen oxides, respectively, emitted by automotive vehicles, fuel combustion, or industrial sources. Average figures from incinerator effluent analysis show CO2, SO2, and HCl to constitute 6.8, 0.020, and 0.024 vol %, respectively. Reference is made to a new type of incinerator where an attempt is made to substitute incineration by pyrolysis and flue gases are passed through washing systems to eliminate air pollution. Such incinerators are being experimented in Switzerland and in West Germany.

20055 APTIC NO. 39345

SHALL WE EVER HAVE REALLY CLEAN AIR? Heating and Ventilating Eng., 45(534):336-340, Jan. 1972.

The problems of sulfur dioxide in the atmosphere, whether natural or man-made, are reviewed with respect to mechanisms of formation, damage to human health, chief sources of SO2 emissions, control methods, domestic heating, and control of fuel usage. The correlation between SO2 pollution and chronic respiratory diseases, primarily bronchitis, is well established although not determined within a direct cause-effect relationship. The major sources of emission are fuel combustion and industrial processes, e.g., smelting. Trends in liquid-solid fuel consumption, and the effect of a change from one to the other on SO2 pollution, are considered. Within the framework of SO2 emission control, the alternatives include the use of energy sources which do not involve combustion of conventional fuels; the use of low-sulfur content fuels; fuel desulfurization; and removal of SO2 from flue gases prior to emission into the atmosphere. Control of emissions through improvements in domestic heating techniques and through control of fuel usage is also discussed.

20056 APTIC NO. 39350

Kashima Citizens Council (Japan)

THE REALITIES OF THE ROSY DEVELOPMENT PLANS OF THE KASHIMA INDUSTRIAL COMPLEX (IBARAGI PREF.) - DAMAGES BY SO-CALLED POLLUTIONLESS DEVELOPMENT AND ANTI-POLLUTION MOVEMENT. *(Barairo no Kashima kaihatsu no genjitsu (Ibaragi-ken) - mukogai kaihatsu no genjitsu to kogai hantai undo). Text in Japanese. Kankyo Kankyo Hakai (Environ. Destr.), 3(2):10-15, Feb. 1972.*

The development of the Kashima Industrial Complex, which is publicized as a pollutionless construction or creation of a sunny and green industrial area without public nuisance, is a fairy tale. No countermeasures for public nuisance have been taken either by the prefecture or the industries. All forms of pollution have worsened increasingly since the beginning of the construction of the 3300-hectare industrial site. The smoke emitted from the production facilities contains over 900 tons of sulfur dioxide per day. The only control measure that has been taken has been the installation of high stacks but this has not solved the problem of air pollution. No stack gas desulfurization system has been provided to date. The area is heavily polluted by industrial waste piles and notions odors from both factories and waste piles, by stack gas and settling particles, suspended particulates, noise and vibration, and traffic congestion caused by the lack of road plans prior to creation of the industrial complex.

20057 APTIC NO. 39437

Dept, of Interior, Washington, D. C., Bureau of Reclamation

DRAFT OF ENVIRONMENTAL STATEMENT. NAVAJO PROJECT. *91p., Jan. 1971. 10 refs.*

The construction of 2310-megawatt coal-fired Navajo Generating Station in northern Arizona began in April 1970. The generating station will consist of three generating units, each with a nameplate rating of 750,000 kw, and will have six cooling towers, two for each unit, probably of the crossflow, induced-draft type. Towers will be about 65 ft high, 70 ft wide, 400 ft long, and will have a waterflow of 270,000 gal/min. Meteorologic studies show three potential inversion levels, at the generating site: ground or surface inversion, valley depth inversion, and air mass inversion. Two types of monitoring systems will be used: stack effluent detectors and off-site ambient air quality instruments. The current plan to maintain air quality includes installation of a tall stack to provide adequate dispersion of flue gases and an electrostatic precipitator for particulate removal, use of low sulfur coal, review of the available processes for sulfur dioxide removal, and installation of a boiler which utilizes a tangential firing pattern. Particulate and SO2 control methods are discussed and air quality requirements are given. Water quality requirements vegetation and visibility effects, and cumulative environmental impact are also considered.

20058 APTIC NO. 39455

Resources Research Inc., Washington, D. C.

AIR POLLUTANT EMISSION FACTORS. *National Air Pollution Control Administration Contract CPA 22-69-119, 326p., April 1970. 335 refs.*

NTIS: PB 206924

Atmospheric emission data are compiled for 40 selected processes representing the following source categories: stationary fuel combustion, refuse disposal, chemical manufacturing industries, the food and agricultural industry, metallurgical industries, the mineral products industry, and solvents. One-half of the 40 processes discussed involve an updating or review of emission factors compiled in 1967. The remaining factors represent new processes for which emission factors were not previously availble. Information for emission factors was gathered primarily from the technical literature up to November 1969, state and local air pollution control agencies, trade and professional associations, and individual companies and persons within the various industries under study. The greatest weight was given to actual measured emission data, i.e., source tests. When feasible, emissions were estimated by making material balances and process loss or yield calculations.

20059 APTIC NO. 39461

Midwest Research Inst., Kansas City, Mo.

PARTICULATE POLLUTANT SYSTEM STUDY. VOLUME II - FINE PARTICLE EMISSIONS. *Air Pollution Control Office Contract CPA 22-69-104, MRI Proj. 3326-C, 335p., Aug. 1, 1971. 87 refs.*

A program was conducted to quantify fine particle emissions (0.01 to 2 micron) from particulate pollution sources. The primary objective was to use the best data currently available on particle size distributions of particulates from uncontrolled and controlled sources, fractional efficiency curves for specific control devices, and the degree of application of control equipment on specific sources to estimate the mass and number of fine particles emitted from particulate pollution sources. Secondary objectives were the assessment of the applicability of standard sampling and particle sizing methods to the fine particle regime, and the current understanding of the adverse effects of fine particulate pollutants on human health. Major sources were stationary combustion (coal, fuel oil, natural gas, and liquified petroleum gas used in industries and electric utilities); crushed stone; iron and steel manufacturing (sintering, open hearth furnaces, basic oxygen furnaces, electric arc furnances); kraft pulp mills; cement plants and rotary kilns; hot-mix asphalt plants; ferroalloys; lime plants; secondary nonferrous metallurgy; carbon black; coal preparation plants; petroleum refining; incinerators; fertilizer manufacturing; iron foundries and cupolas; and sulfuric and phosphoric acid manufacturing. Efficiency of control equipment including electrostatic precipitators, fabric filters, wet scrubbers, and cyclones is also discussed. Projections of particulate emissions to the year 2000 and modifications of the atmosphere by particulate pollution are mentioned.

20060 APTIC NO. 39462

Midwest Research Inst., Kansas City, Mo.

PARTICULATE POLLUTANT SYSTEM STUDY. VOLUME III - HANDBOOK OF EMISSION PROPERTIES. *Air Pollution Control Office Contract CPA 22-69-104, MRI Proj. 3326-C, 626p., May 1, 1971. 302 refs.*

Details of the methodology employed to obtain data concerning the kind and number of stationary particulate sources, the chemical and physical characteristics of both the particulates and carrier gas emitted by specific sources, and the status of current control practices, are presented. Emission factors and rates, chemical and physical properties of effluents, and control practices and equipment are given for stationary combustion processes (power generation and furnaces); mineral processing; agricultural operations (field burning, grain elevators, cotton gins); iron and steel manufacturing; cement manufacturing; forest products industry (sawmills, pulp industry); primary nonferrous metallurgy (copper, lead, zinc, and aluminum smelting and refining); clay products; fertilizer manufacturing; asphalt; ferroalloy manufacturing; iron foundries; secondary nonferrous metals industry; coal preparation; carbon black manufacturing; petroleum refining; acid manufacture (sulfuric acid and phosphoric acid); and incineration. The control equipment includes cyclones, wet scrubbers, electrostatic precipitators, fabric filters, mist eliminators, and afterburners. Effluents include dusts, particulates, fly ash, sulfur oxides, hydrocarbons, and other noxious gases. Costs for control equipment purchase and operation are given. This hand-

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book constitutes a reference source for available information on the distinguishing features of the various particulate pollution sources and should be of value to air pollution regulatory agencies, control equipment manufacturers, and industrial concerns.

20061 APTIC NO. 39667

Resources Research Inc., Washington, D. C.

AIR POLLUTANT EMISSION FACTORS SUPPLEMENT. *National Air Pollution Control Administration Contract CPA 22-69-119, 55p., Aug. 1970. 48 refs.*

NTIS: PB 206923

Air pollution problems associated with the following processes are discussed: coal preparation, explosives manufacturing, ferroalloy production, nitrate fertilizer manufacture, and soda ash manufacture. The effects of operating variables and control equipment efficinecy on the amounts of emissions are summarized.

20062 APTIC NO. 39670

Dept. of the Navy, Washington, D. C., Office of the Chief of Naval Operations

FINAL ENVIRONMENTAL IMPACT STATEMENT. NAVY F-14 FIGHTER AIRCRAFT. *41p., Sept. 1971.*

NTIS: PB 199851-F

By nature of its design and operating principles, the turbofan engines in the F-14 fighter plane will have less effect on the environment than a pure turbo engine. The exhaust jet emitted from the engine contains some chemical products of incomplete combustion (such as carbon monoxide), some short chain hydrocarbons from cracking the fuel molecules rather than burning them, and some smoke. Specific pollutants are CO and hexane. The possibility of environmental contamination if a crash occurs is discussed. No intolerable environmental effects are foreseen and efforts have been incorporated in the development program to minimize the impact. Specifications for smoke emissions tests of the gas turbine engines are given.

20063 APTIC NO. 39728

Pollution Research and Control Corp., Glendale, Calif.

SUMMARY REPORT ON AIR POLLUTION EMISSION INVENTORY FOR THE STATE OF NEW MEXICO. *Air Pollution Control Office Contract, 51p., Aug. 1971. 20 refs.*

NTIS: PB 204384

Emissions of particulates, sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides within each New Mexico Air Quality Control Region are summarized by source type, i.e., point or area. There are five source categories in the inventory: stationary source fuel combustion, industrial process losses, solid waste disposal, and miscellaneous sources. In general, point emissions data were obtained by contacting the individual company; area source data were obtained from published or unpublished information, government agencies, and utilities. Annual emissions from source categories are summarized in the form of pie charts showing the appropriate percentages.

20064 APTIC NO. 39745

THE PETROLEUM REFINING INDUSTRY--AIR POLLUTION PROBLEMS AND CONTROL METHODS. INFORMATIVE REPORT NO. 1. PETROLEUM COMMITTEE TI-3. *J. Air Pollution Control Assoc., 14(1):30-33, Jan. 1964. 41 refs.*

In 1952 the American Petroleum Institute Division of Refining established a Smoke and Fumes Committee, which set up a program to determine the relationship between community air pollution problems and various phases of its operations as well as the use of its products. Research projects were established at recognized professional organizations and qualified research centers. A general report is given covering the field of possible airborne contaminants from refining operations, and it is intended as a guide for refining personnel and regulatory agencies. The refining operation is outlined, and potential sources of specific emissions are listed. These include oxides of sulfur, hydrocarbons, oxides of nitrogen, mercaptans, hydrogen sulfide, phenolic compounds, naphthenic acids, organic sulfides, nitrogen bases, aldehydes, carbon monoxide, and particulate matter. Absorption, adsorption, chemical conversion to another compound, incineration, as well as other methods are indicated for the control of gaseous emissions at refineries. Filters, gravity settling chambers, cyclone separators, mechanical centrifugal separators, electrostatic precipitators, and sonic agglomerators are indicated for the control of particulate emissions.

20065 APTIC NO. 39754

Coordinating Research Council, Inc., New York, Air Pollution Research Advisory Committee

THE EFFECTS OF LEADED AND UNLEADED GASOLINES ON EXHAUST EMISSIONS CAUSED BY COMBUSTION CHAMBER DEPOSITS. (FINAL REPORT). *Rept. CRC 441, Project CRC-APRAC-CAPE-3-68, 101p., July 1971. 4 refs.*

NTIS: PB 201946

The influence of lead alkyls in gasoline on combustion chamber deposits and their effect on exhaust emission levels were investigated. Hydrocarbon emissions from consumer-type cars using unleaded fuels to accumulate mileage were about 7% lower on the average than the cars using leaded fuels. The net lead effect was essentially the same for cars with and without exhaust control systems. Lead did not have any effect on carbon monoxide and nitrogen oxides emissions. In rapid mileage accumulation vehicle tests, the overall hydrocarbon net lead effect was 20%, or about three times as great as in the consumer-type vehicle tests. In laboratory engine and special tests, combustion chamber deposits were responsible for almost all of the increase in hydrocarbon emission. There was a 1-10% increase in hydrocarbon emissions due to lead alkyls. Test summaries are tabulated in detail.

20066 APTIC NO. 39067

Aalund, Leo R.

REFINING TRENDS ARE SUBMERGED BY FLOOD OF UNCERTAINTIES. *Oil Gas J., 70(13):108, 111, 115, 117, 120, 125-126, March 27, 1972.*

Leading the list of uncertainties confronting refinery industry planning are capital availability, crude oil supply, lead removal, fuel costs, refinery sites, processing schemes and product patterns, and environmental protection regulations. In 1965 capital expenditures for refining were $600 million, in 1970, $1.075 billion. This was a growth rate of over 12%/yr. After capital, the biggest uncertainty facing refiners is U. S. oil-import policy, and the increasing reliance on both foreign crude and capacity. The Environmental Protection Agency timetable for lead removal from gasoline and the motor vehicle modified with a lower compression motor and a catalytic converter present the refiner with difficult to meet process modification requirements. The choice between hydrocracking and catalytic cracking is considered.

20067 APTIC NO. 39279

Agarwal, Paul D.

ELECTRIC CAR AND AIR POLLUTION. *Preprint, Society of Automotive Engineers, Inc., New York, 20p., 1971. 24 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710190.)*

Emissions of air pollutants at the power plants to generate the energy required to charge the batteries for electric cars are calculated and compared with those from internal combustion engine automobiles meeting federal emission standards. The relative effect of these two types of vehicles on the environment depends on the degree of emission controls imposed on electric power plants. Pollutant emissions for internal combustion engine automobiles and electric cars, i.e., coal burning power plants, are compared for hydrocarbons, nitrogen oxides, carbon monoxide, sulfur dioxide, and particulates, indicating that electric cars would result in more pollutants than gasoline powered vehicles with emission controls, and hence, aggravate the air pollution problem on an area wide basis. Carbon dioxide emissions and possible alternatives for the future are discussed. (Author abstract)

20068 APTIC NO. 39581

Appl, Max and Horst Goessling

PRODUCTION OF SYNTHESIS GAS BY THE STEAM-REFORMING PROCESS. *(Herstellung von Synthesegas nach dem Steam-Reforming-Verfahren). Text in German. Chemiker Ztg. (Heidelberg), 96(3):135-153, March 1972. 96 refs.*

The present status of the steam reforming process for the production of synthesis gas is reviewed with respect to the kinetics, thermodynamics, and catalysts involved; the optimum design of technical reformers; mechanical and metallurgical problems; methods for the treatment and purification of crude synthesis gas; economics; and future prospects. For heating at the steam reforming process, burners fueled by natural gas, gasoline, and fuel oil can be used; waste gases can also be added. For utilization of the flue gas heat, exchangers are installed behind the reformer. The waste heat is commonly used for preheating the hydrocarbon/steam mixture which is to be cracked, preheating the air in the secondary reformer, steam production for preheating the boiler supply water, and preheating the primary air.

20069 APTIC NO. 39401

Arkhangelskiy, V. M. and A. V. Skotta

ON THE PROBLEM OF DETERMINING THE NON UNIFORMITY OF FUEL-MIXTURE DISTRIBUTION BETWEEN THE ENGINE CYLINDERS UNDER ACCELERATION CONDITIONS. *(K voprosu opredeleniya neravnomernosti paspredeleniya goryuchey smesy po tsilindram dvigatelya na reznimakh razgona). Text in Russian. Avtomob. Prom., no. 1:5-7, 1971. 6 refs.*

Bench tests on the non-uniformity of the fuel-mixture distribution between the engine cylinders under acceleration conditions, and the results obtained are described. The non-uniformity of the mixture distribution was determined from the carbon monoxide and carbon dioxide content in the exhaust, and from direct measurements of the air and fuel consumption, respectively. Solenoid controlled stroboscopic exhaust sampling with simultaneous measurements of speed, torque and maximum pressure oven 11-13 acceleration cycles was applied. Formulae for the air excess coefficient and the non-uniformity under acceleration conditions are given. The results obtained revealed the quantitative non-uniformity during acceleration to be different from that under stationary conditions. The mean value of the non-uniformity was lower during the initial period of the acceleration than under stationary conditions. the non-uniformity increased during the final stage of acceleration to exceed the corresponding value for stationary conditions with identical carburetor adjustment, and to decrease again at the end of the acceleration. Increased primary speeds caused a slight decrease in the maximum of the non-uniformity mean. The differences in the non-uniformity under acceleration and stationary conditions may be due to the redistribution of the fuel between vapor, droplet, and liquid phases in the suction pipe.

20070 APTIC NO. 39085

Bachman, W. A. and Dibrell DuVal

INDUSTRY HAS GOOD YEAR AHEAD IF NOT SIDETRACKED BY POLITICS, ECONOMICS. *Oil Gas J., 70(5):81-96, 100, Jan. 31, 1972.*

Despite a bagful of economic and political uncertainties, the petroleum industry should find 1972 a year of steady gains and moderate prosperity. Motor gasoline demand is expected to increase by 4.3%, distillate by 4.9%, residual by 4.1%, and liquefied petroleum gas by 6.9%; however, naphtha jet fuel should be off by about 5%. Crude production will increase by 2%, natural gas liquids production by 2.4%, imports by 12.2%, refinery crude by 2.1% and drilling should show an 8.2% gain. In the price arena, consumer prices are expected to rise 3% compared to a 4.6% rise in 1971. Wholesale prices should go up 2.4% compared to 3.4%. Consumer spending is expected to increase by 9%, industrial production by 5.5%, capital spending by 7.5%, and there should be 2.5 million new housing starts. Company profits will depend on ability to work off high product inventories without weakening prices. The transportation sector will continue to be a strong force in pushing petroleum demand higher, and the heating sector also will exibit strong demand. Supply, demand, the nation s refinery capacities, and the outlook for drilling are discussed and considered tabularly. Crude oil fields are listed according to state.

20071 APTIC NO. 39066

Bagge, Carl E.

PROBLEMS AND PROMISES OF THE COAL INDUSTRY. *Mines Mag. (Denver), 61(10):8,10-13, Oct. 1971. (Presented at the Wyoming Mining Association, Annual Convention, 16th, Casper, Wyo., June 25-26, 1971.)*

The coal industry has a critical role to play in the nation s energy economy, and Wyoming has an increasingly significant part to play in helping meet the growing demand for this vital energy resource. As the continued search for coal, especially low sulfur coal, goes on, Wyoming, blessed with abundant low-sulfur coal supplies, will come more and more into the forefront of the American coal producing industry. The availability of western coal reserves for gasification was recently demonstrated. Mine safety, a proposed tax on sulfur emissions, state and federal regulations, and the political climate with respect to fuel demands are considered.

20072 APTIC NO. 39266

Berkowitz, N.

OBJECTIVES IN FUELS RESEARCH. *Preprint, Inst. of Combustion and Fuel Technology of Canada, Ottawa (Ontario), 14p., 1970. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31-June 3, 1970, Paper ICFTC-NAFTC-1.)*

Objectives in fuels research with respect to the early development of fuel science into an interdisciplinary field, difficulties attending definitions of modern fuel science and fuels research and the principal directions of current fuels research, and development are reviewed. Changing patterns of research bearing on fuels exploration and production, transportation, combustion, and processing are emphasized. As a result of new gas discoveries and viable long distance oil movement via supertankers, there is an extensive reorientation of combustion reserach and development toward liquid and gaseous hydrocarbon fuels. Research on fluid-bed high-intensity combustors, flame aerodynamics, chemiluminescene, chemi-ionization, the effects of superimposed fields on flame properties, catalysis, hydrocarbon chemistry, and fuels conversion, i.e., coal hydrogenation and gasification are discussed. Pollution control programs and the growing interest in carbon-based advanced materials are reviewed. (Author abstract modified)

20073 APTIC NO. 38740

Bienz, J. and H. N. Sharan

HOT-GAS-GENERATOR/HOT-GAS-BOILER, A NEW COMBUSTION SYSTEM FOR STEAM AND HEAT PRODUCTION. *(HGE/HGK, ein neues Verbrennungssystem fuer Dampf- und Waermeerzeugung). Text in German. Mitt. Ver. Grosskesselbetr., 52(1):1-8, Feb. 1972. (Presented at the Vereinigung der Grosskesselbetreiber- Sondertagung, Skandinavien 1971, Stockholm, Sweden, March 25, 1971.)*

All the disadvantages of conventional boiler systems can be traced back to the combination of combustion and heat transfer. The new system for steam and heat production is based on a separation of these two processes. This new solution is very economical because a smaller combustion chamber can be used and the mixing space can be smaller. The fuel is burned in several uncooled ceramic lined burners. Both oil or gas can be burned simultaneously and in the same chamber. The first measurements of the nitrogen oxides concentration in the waste gases from the new system showed that they are below those of conventional front-fired oil systems and somewhat higher than those at tangential firing. This is due to the fact that the residence time in the hot-gas- generator is only a fraction of the time of that in conventional combustion chambers. Measures for a reduction of these emissions are being tested. In natural gas-fired systems, the NOx concentration is below that of conventional boilers. Because of the high combustion temperatures, the sulfur trioxide formation will be lower than in conventional boilers.

20074 APTIC NO. 39367

Biersteker, Klaas

AIR POLLUTION CONTROL IN THE NETHERLANDS. *Tijdschr. Soc. Geneesk., 50(1):17-21, Jan. 1972. 22 refs. (Presented at the Regional Office of WHO, Copenhagen, Denmark, Jan. 19-22, 1971.)*

Trends and developments in air pollution control in the Netherlands are reviewed. Although the problem is not a new one, factors such as the absence of very large cities, the limited use of soft coal the presence of strong winds, topographic factors, and late industrial developments contributed to a relatively favorable pre-war situation. The main areas of concern at the moment include the malodors produced by refineries, petrochemical industries, and food and feed operations; the transmission and amplification of trace elements, e.g., lead, mercury, and cadmium, and of pesticides; the potential hazard of production, storage, or transport of dangerous chemicals; photochemical smog due to traffic exhaust and hydrocarbon emissions from industries; and the inhalation of asbestos fibers. The use of natural gas for domestic heating, higher chimneys, and improved urban ventilation have greatly minimized pollution due to sulfur dioxide and smoke. Control measures for the pollutants and their sources are implemented by legislation, inspections, air pollution effect studies, air quality controls, permits, and emission standards. New legislation now opens possibilties to approach the pollution on a regional scale, which is essential for effective control.

20075 APTIC NO. 39623

Bossler, Robert B.

FORECASTING EVAPORATION LOSSES. *Oil Gas J., 38(13):63, Aug. 10, 1939.*

A method is given for calculating the decrease in volume or volume loss accompanying a gravity loss caused by the evaporation of light fractions from crude oil. Utilizing distillation analysis of the crude, the method can give the gravity of the residual crude after weathering off a given volume. or the percentage volume of a crude which has suffered a given gravity loss. The calculation is based on the fact that the sum of the cuts times their specific gravities must be equal to the original volume of the crude multiplied by its specific gravity, and the consequent fact that oil must equal the original volume multiplied by its specific gravity, minus the sum of the volumes of the various cuts multiplied by their specific gravities. Results of a sample calculation are given.

20076 APTIC NO. 38756

Bowen, D. H. M.

SOLVENT VAPORS UNDER FIRE. *Environ. Sci. Technol., 5(11):1086- 1087, Nov. 1971.*

Current thinking about the smog formation process is that reactive hydrocarbons from several sources combine with oxides of nitrogen stemming largely from automobiles and combustion processes to produce oxidants under certain conditions of meteorology and sunlight. About 40% of the hydrocarbon emissions arise from industrial operations and organic solvent evaporation. Now that federal regulations are well on the way to cutting automobile hydrocarbon emissions drastically, there is certain to be greater emphasis on curtailing emissions from stationary sources. A recent development that is sure to push things along is the promulgation of a national ambient air quality standard for hydrocarbons. The standard -- 160 micrograms/cu m, a maximum 3-hour concentration not to be exceeded more than once a year -- was arrived at by considering the role of hydrocarbons in the formation of oxidants, rather than their own harmful effects. The relative contribution of various solvents to smog formation and the establishment of hydrocarbon reactivity indexes are considered. Odor complaints are mentioned. There are three common ways to cut emissions or organic solvents: incinerate the gases so that the hydrocarbons are totally oxidized to carbon dioxide and water; scrub the gases with a suitable liquid to remove the organics; change the process so that no solvent is needed or switch to a solvent that is less odorous.

20077 APTIC NO. 39650

Breese, Frank

REFINERIES AREN T TOP SMOG MAKERS. *Petrol. Process., 9(4):515-519, April 1954.*

Spokesmen for the petroleum industry claim that the industry is responsible for only a very small amount of the materials which are supposedly responsible for smog. The hydrocarbons contribution of the petroleum industry to the one million tons of polluted air estimated to be in the Los Angeles Basin atmosphere daily is small only 315 tons or 0.0315%. The role of the hydrocarbon in pollution is over-emphasized, and present smog laws are adequate The oil industry has installed sulfur recovery units to prevent sulfur dioxide emissions and is engaged in a four-step program of installing floating roofs on gasoline and cracked stocks storage tanks of more than 10,000-bbl capacity.

20078 APTIC NO. 39582

Brinke, R.

A CROSS SECTION THROUGH THE FIRING TECHINQUE. PRACTICAL EXPERIENCE. *(Quer durch die Feuerungstechnik - Erfahrungen aus der Praxis). Text in German. Bundesverband Oelfeuerungen und Gasfeuerungen e. V. (West Germany), INTHERM, Int, Fachmesse Oelfeuerung Gasfeuerung, 11th, Stuttgart, West Germany, 1971, p. 47-67. (March 3-7.)*

Current problems in firing techniques are outlined. The S type fuel oil, widely used in West Germany, is responsible for increased build-up in the burning chamber of carbon residue and water-soluble substances. Sootless combustion is a major factor in the competition of fuel oil and gas. The joint burning of solid and liquid combustibles in heating boilers is prohibited in West Germany. Horizontal chimney intakes for burners without preliminary ventilation may cause puffs as ignitable mixtures explode during the next start-up. A maximum of four units should be connected to a common waste gas pipe which may have an over-all length of maximum 1 m with chimney heights below 4 m, and a maximum of 2 m with chimney heights above 2 m. If burners without blower and draft diverter are used, it is best to connect only one firing to a chimney, applying a chimney intake laid at 45, in observing a minimum distance of 10 m between burner level and top chimney.

20079 APTIC NO. 38871

Brocke, Werner and Horst Schade

THE AIR POLLUTION THROUGH WASTE GASES DEVELOPING AT THE COMBUSTION OF FUEL IN STATIONARY PLANTS OF THE FEDERAL REPUBLIC OF GERMANY. PART 1.: THE SO2, NOX AND PARTICULATE EMISSION IN THE YEAR 1969 AND A PREVIEW OF THE DEVELOPMENT UNTIL 1980. *(Die Luftverunreinigung durch Abgase aus der Verbrennung von Brennstoffen in stationaeren Anlagen der Bundesrepublik Deutschland. I. Teil: Die SO2-, NOx- und Feststoffemissionen im Jahre 1969 und eine Prognose ueber die Entwicklung bis 1980). Text in German. Staub, Reinhaltung Luft, 31(12):473-478, Dec. 1971. 28 refs.*

Based on the fuel consumption (hard and soft coal, oil, and gas) and the specific sulfur dioxide emissions, the SO2 discharge from stationary firing systems was calculated. The calculations were carried out under the assumption that no measures for the reduction of the emissions are taken. For the year 1969 a total SO2 emission of 3.5 million tons SO2 was found, 1.5 million tons of SO2 fell on the combustion of hard coal, 0.6 million tons on soft coal, and 1.5 million tons on the light and heavy fuel oil. The contribution by the natural gas is negligibly small. In 1969 it amounted to only 69 tons. The SO2 emission by refuse incinerators amounted to 16,000 tons in 1969. According to the estimate 4.4 million tons of SO2 will be emitted in 1975 and 5.4 million tons in 1980. The amount contributed by the combustion of hard coal will go down, the amount contributed by the combustion of soft coal will remain about the same, while that contributed by the burning of fuel oil will go up. By 1980 more than 2/3 of the SO2 emissions will stem from the combustion of fuel oil. The emission of the oxides of nitrogen lay between 0.8 million and 2 million tons. For the year 1980, the emissions will have risen to between 1 and 3 million tons/yr. The total particulate emission amounted to 1 million tons in 1969. These emissions will go down until 1980 to 0.9 million tons because of the declining use of solid fuels. The solid emission by refuse incinerators was 1200 tons in 1969, and it will rise to 3160 tons until 1980. The contribution of emissions by incinerators to the total emission is small.

20080 APTIC NO. 38941

Buckley, N. A.

POLLUTION OF THE ENVIRONMENT. *(J. Inst. Munic. Eng.), 99(3):92-97, March 1972. 8 refs.*

The potential pollution by the year 2000 will be much more than twice the 1970 pollution, and there is no doubt that man himself is the root source of all troublesome pollution. Pollution of the sea and rivers, atmospheric pollution, noise, pesticides, artificial fertilizers, and solid wastes are briefly considered. Since 1956, industrial pollution has ben attacked in Great Britain by gradual elimination of the worst of the coal-fired furnaces, while domestic pollution is being reduced by the smoke control area technique. A local authority proceeds to achieve smoke control over its whole area by making smoke control orders, each covering one portion of the area. Over a programmed period of years, a whole local authority area is thus brought gradually under smoke control. The ground-level measurement of smoke and sulfur dioxide is carried out at hundreds of sites over Britain in the form of a national survey.

20081 APTIC NO. 39706

Crow, J. H. and J. R. Dungan

HOT POTASH PROCESS PURIFIES GAS AT LONE STAR S FASHING PLANT. *Oil Gas J., 56(47):97-99, Nov. 24, 1958.*

Designed to process 100 million cu ft of gas per day, the Lone Star Producing Co. Fashing, Tex., plant is probably the world s largest natural gas treating plant to use the hot potassium carbonate process. Natural gas produced from the Edward Lime formation in the Fashing area contains a total of 9.4 mile% hydrogen sulfide and carbon dioxide as impurities, which must be removed prior to pipeline delivery. The Fashing gas purification plant economically removes the acid gases from the natural gas stream by first scurbbing the gas with hot potassium carbonate solution, followed by final purification using aqueous monoethanolamine solution. The plant cooling system, mechanical-seal flush system, plant spares, and acid disposal are described, as well as the potash system cycles and the monoethanolamine solution cycle.

20082 APTIC NO. 38821

Eick, H.

COMBUSTORS - CONSTRUCTION AND APPLICATION. *(Combustoren - Konstruktion und Anwendung). Text in German. Oel Gasfeuerung, 17(1):20-26, Jan. 1972.*

A complete combustion is achieved in combustors where fuel oil is first partially burned and converted into a hot gas. In the actual combustion chamber, the final and complete combustion follows. The two-step process can be controlled so that a soot number of one is obtained for instance by operating with an air surplus of 10% and by recirculation of 10% of the combustion gases, or with 0% air surplus and a recirculation of 50% of the combustion products. The simplest type of combustor consists of a pot which is lined with a fireproof mass. The oil drops into the pot from the top. Part of the combustion air enters tangetially, which imparts a rotary movement on the air flow. Soot formation is high at the partial combustion process. It can be reduced by the addition of water vapor. In another type of combustor, a reduction of the soot development at the first stage of the two-step process is achieved by production of a double vortex with the entering air. Although pollutants do develop at the first stage of the two stage combustion process at high concentrations, they are burned entirely in the second stage. In the future, this combustion technique will have to be taken somewhat more into consideration, particularly with the more stringent requirements concerning carbon dioxide and soot emission.

20083 APTIC NO. 38777

Eickelpasch, Dieter

CARBON MONOXIDE AT THE STEEL PRODUCTION. *(Kohlenmonoxid bei der Stahlerzeugung). Text in German. Staub, Reinhaltung Luft, 32(2):52-54, Feb. 1972.*

In steel production processes the carbon monoxide emission is determined by the carbon input. At the Siemens Martin furnace, the largest carbon quantity is entered with the fuel oil containing 86 to 90% carbon. At the oxygen lancing process, the carbon content of the ore determines the CO emission. At a 200-ton Siemens Martin furnace which is operated with 35 to 40% liquid charge, 3.5 tons of C/charge enter into the furnace. With the 18000 kg oil per charge used for heating the furnace, 16 tons of C/charge enter. A carbon monoxide-free combustion is achieved by preheating the primary air for combustion, by preheating the oil, by pressure atomization, by special burners with preliminary atomization and by a minimum fuel to air ratio of 1:2. The temperatures immediately behind the combustion chamber are still 1700 C which guarantee a most complete combustion of the carbon. During the oxygen lancing process, two operating ranges must be distinguished: the combustion at lambda of more than one and the partial combustion at lambda of less than one. At the full combustion the waste gas composition and temperature is much like that at the Siemens Martin furnace (1700 C, air surplus). At the partial combustion, CO develops because any air excess is purposely prevented in order to maintain a low waste gas quantity for dust cleaning. In this case the CO must be burned in a flare. The difficulties encountered here are briefly discussed.

20084 APTIC NO. 39703

Faith, W. L.

WHAT CAUSES SMOG? WHAT REMEDIES HAVE WE? Refining Eng., vol. 28:C3-C8, Oct. 1956.

Sources of atmospheric hydrocarbons and related organic compounds are reviewed, including the production, refining, distribution, and marketing of petroleum; auto exhaust and evaporation; diesel engines; incinerators; and solvents and paint-thinners. The question of how much hydrocarbon reduction is necessary to alleviate smog is currently being studied, although it is generally understood that concurrent control of nitrogen oxides will also be required. Auto emission control by improved combustion efficiency of the engine is discussed, based on data gathered by the Los Angeles County Air Pollution Control District on the variation of efficiency with different engine operating cycles, and the potential effectiveness of afterburners and catalytic converters is evaluated.

20085 APTIC NO. 39584

Fehr, Eugen

OIL (FUEL) BURNING HEATING BOILERS. *(Oelbefeuerte Heizkessel). Text in German. Bundesverband Oelfeuerungen und Gasfeuerungen e.V. (West Germany), INTHERM, Int. Fachmesse Oelfeuerung Gasfeuerung, 11th, Stuttgart, West Germany, 1971. p. 69-74. (March 3-7.)*

Problems of the determination of the over-all efficiency of combined heating boilers, usually intended for year-round service, are outlined. The heat losses of such boilers due to waste gases may lie about 10%. For modern boilers, with not-lined, firebox improved burner flame is required. When improperly designed, such boilers are not able to secure complete combustion, thus causing harmful emissions. Incomplete combustion is caused by the flame contacting the relatively cool boiler surface. The heating surfaces for steel boilers should be made of COR-TEN steel to minimize emissions from the grate, and fairly great discharge heights could be reached by the use of pressurized chimneys made of chromium-nickel alloy. The use of mixed firings for domestic refuse is not economical. Both large-capacity boilers and Bunsen burners will increasingly be used in the future.

20086 APTIC NO. 39445

Feldmann, Herman F., M. A. Leonardo, W. H. Simons, and D. Bienstock

THERMODYNAMIC, ELECTRICAL, PHYSICAL, AND COMPOSITIONAL PROPERTIES OF SEEDED COAL COMBUSTION PRODUCTS. *Bull. Bureau Mines, No. 655, 289p., 1970. 18 refs.*

Thermodynamic, electrical, physical, and compositional data on the seeded combustion plasmas of seven coals for use in the design of magnetohydrodynamics generators are presented. The systems were assumed to be at equilibrium and the design data were generated by solving for the composition of both liquid and gas phases by digital computer. The design data and molar composition for a western sub-bituminous, a Pennsylvania anthracite, and five representative bituminous coals burned with 5% excess air were analyzed with respect to temperature, enthalpy, entropy, specific heat, conductivity, density, heat of products and reaction, and dewpoint of both slag and seed. Complete computer data and a Mollier diagram for each coal are included to allow graphical generator calculations. (Author abstract modified)

20087 APTIC NO. 38739

Forney, A. J., W. P. Haynes, J. J. Elliott, and R. F. Kenny

CLEAN AUTOMOTIVE FUEL: LABORATORY-SCALE OPERATION OF THE SYNTHANE PROCESS. *Bureau of Mines, Pittsburgh, Pa., Pittsburgh Energy Research Center, Bureau of Mines TPR-49, 8p., Feb. 1972. 6 refs.*

Existing Synthane gasification, purification, and methanation pilot plant units were combined in one overall system for the laboratory production of high Btu-gas from caking coal. In the Synthane process, coal is converted to synthesis gas by steam-oxygen gasification in a fluid bed. If the coal is a caking coal, it is rendered nonagglomerating by pretreatment in a fluid bed with steam (or carbon dioxide) plus oxygen. The experimental gasifier operated intermittently, but the methanator operated continuously. Therefore, accumulators were used to store gasifier gas at 500 psig. The gas was then fed at a constant rate to an amine scrubber for removal of carbon dioxide and hydrogen sulfide. In the absence of a shift-converter plant, hydrogen was added to the purified gas (about 40 ppm sulfur) to give a hydrogen/carbon monoxide ratio slightly above 3 to 1. This gas was compressed to 1000 psi and methanated over a tubewall reactor with a nickel catalyst sprayed on the outside surface. A second methanator with a packed bed of Chemetron G-65 catalyst completely reacted the remaining CO, CO2, and ethane. The test demonstrated that there were no impurities in the coal that could affect the methanation operation when the gas was purified by standard procedures.

20088 APTIC NO. 39573

Fricke, Hermann

LARGE-SCALE PRODUCTION OF SYNTHESIS GAS BY PARTIAL OXIDATION. *(Grosstechnische Herstellung von Synthesegas durch partielle Oxydation). Text in German. Chemiker Ztg. (Heidelberg), 96(3):123-134, March 1972. 23 refs.*

The partial oxidation process for the production of synthesis gases is reviewed with respect to the reaction mechanisms and kinetics involved, the impact of the reaction on gas composition, and process controls. The gasification and gas purifying processes are demonstrated using the Texaco, Shell, and Koppers-Totzek processes as examples. In the Texaco process, the soot is removed from the gas by scrubbing with water. The soot-containing scrubbing water is mixed with gasoline for return to the process. The Shell-process also eliminates the soot from the synthesis gas by scrubbing. The soot-containing scrubbing water is treated with small quantities of hydrocarbons, generally with mineral oil used for the process. The waste heat produced at all three processes may be used for the production of high-pressure steam. The partial oxidation process can be used for reducing the sulfur emission at power plants using sulfur-containing fuels. The fuel is gasified by partial oxidation with air; the flue gases are desulfurized; and the cleaned gas is burned entirely. The reaction heat of the first oxidation step is used in the waste heat boiler for production of high-pressure steam. The cleaned gas can be used for operation of a gas turbine. This would reduce SO2 emission to 10% of the emission at direct combustion of the fuel and emission of nitrogen oxides to 25-50%.

20089 APTIC NO. 38889

Fritsch, W. H.

FLOW, STABILITY AND MIXTURE FORMATION OF COMBUSTION. *(Stroemung, Stabilitaet und Gemischbildung der Verbrennung). Text in German. Tech. Mitt., 65(3):101-109, March 1972. 2 refs.*

For satisfactory and complete combustion a furnace must be designed and constructed adequately. The shape of the combustion chamber and the relationship of the length to the diameter is important, also, the size of the chamber with respect to the heat load, the permissible flue gas temperature at the exit of the combustion chamber, the available air at the burner, the presence of dust, and the resistance of the waste gas system influence the combustion process. The volume of the combustion chamber and the heat capacity determine the heat load of the combustion chamber. With increasing load the residence time of the gases and the time available for mixture formation and for combustion decreases. The available quantity of air may be smaller than the stoichiometric quantity. For such an operation and without development of soot, the recirculation of hot combustion gases is of great importance. Another method for the prevention of soot development at combustion with lack of air uses high flame temperatures and an extremely fast mixture formation. Three types of mixture formation are commonly used: mechanical distribution of the fuel, turbulent mixing, and diffusion mixing.

20090 APTIC NO. 38995

Fukuchi, Hiroaki

PUBLIC NUISANCE IN OKINAWA - 1: REAL CONDITIONS OF PUBLIC NUISANCE. *(Okinawa no kogai - 1 Kogai no jittai). Text in Japanese. Kogai Kenkyu (Stud. Publ. Nuisance), 1(2):15-21, Oct. 1971.*

Various public nuisance episodes in Okinawa are discussed. Air pollution is mainly a result of industrial operations. Since April 1970, sugar factories in north have been emitting an average of 70.97 tons/month/sq km of settling particles. Inhabitants have complained of eye irritations, breathing difficulties, coughing, mucous, dizziness, and headaches. Installation of dust collectors has improved the situation slightly, but pollution and resultant damages continue to exist and a public nuisance control council has been formed. Lime kilns in Nawa City create soot, dust, smoke, and obnoxious odor. The five stacks of the kilns are only 15 m high. A plywood manufacturing plant in Nawa City emits much soot and its stack gases have deleterious effects on drinking water and laundry. A cement factory in the same city has caused heavy deposits of settling particles on roofs, in rooms, and on laundry and has polluted drinking water and damaged agricultural produce. The dust from close to 30 quarries of the Nago area is extremely heavy. In June 1969, inhabitants of two districts of Nago City protested and forced the cement company to reduce the annual averag emission of 500 tons of dust to 14 to 15 tons, and demanded compensations for the damages caused between 1965 and 1969. In May 1971, the dispute was settled for $80,000.

20091 APTIC NO. 38859

Gall, Karl

LIQUID GAS AND ENVIRONMENTAL PROTECTION. *(Fluessiggas und Umweltschutz). Text in German. Allgem. Prakt. Chem. Vienna, 23(1/2):13-15, 1972. 7 refs.*

Liquid gases (propane, butane, propylene, and butylene) and natural gas (methane and ethane) contain very few pollutants, e.g., only 0.005% by weight of sulfur, while light fuel contains 1.5% sulfur. Coal contains by far the most pollutants. An intense mixing of the liquid gas with the combustion air can be easily provided a factor which is tremendously important for a complete combustion. For future avoidance of pollutant emissions by combustion processes it will be absolutely necessary to use liquid gases as fuel. As far as quality goes, there is hardly any difference between liquid gases and natural gas. It is rather a matter of availability.

20092 APTIC NO. 39035

Garcia Escolar, L. and M. Paz Castro

DETERMINATION OF LEAD IN GASOLINES. VI. *(Determinacion de plomo in gasolinas. VI.). Text in Spanish. Ion (Madrid), 32(367):100-101, Feb. 1971. 1 ref.*

Increased amounts of mineral digesting agents are required for lead determination in gasolines with large amounts of nonsaturated hydrocarbons. The excess of chlorine is then removed with hydrogen peroxide, sodium thiosulfate, or sodium bisulfite. The technical procedure includes extraction of 10-25 ml gasoline samples with carbon tetrachloride chlorine solutions and reextraction with distilled water. The water extracts are then brought to boiling temperatures, treated with a few drops of 3% H2O2, and added to a known amount (10 ml) of EDTA. The mixture is removed from the heating plate 1 min later, 1 ml of hydroxylamine and 1 ml of potassium cyanide are added (to prevent interference with manganese or iron, respectively), and the mixture is titrated with a 0.01 M magnesium ion solution in the presence of an appropriate indicator Utilization of 2,3-dimercapto-1-propanole which displaces lead (but not manganese) from its EDTA complex is required to account for large amounts of manganese, if present in the sample. Reference is made to a previous paper where the technological procedure for the analytical method was thoroughly described. Utilization of H2O2 for the removal of excessive chlorine from digested gasoline samples was tested on two automobile and two aircraft fuel varieties (10-12 fold repetitions) and satisfactory reproducibility of analytical figures was observed.

20093 APTIC NO. 39277

Gelb, G. H., N. A. Richardson, T. C. Wang, and B. Berman

AN ELECTROMECHANICAL TRANSMISSION FOR HYDRID VEHICLE POWER TRAINS--DESIGN AND DYNAMOMETER TTSTING. *Preprint, Society of Automotive Engineers, Inc., New York, 24p., 1971. 3 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710235.)*

A parallel hybrid electric power train, the electromechanical transmission, is examined with respect to emission reduction, fuel consumption, and power flow efficiences. The system utilizes a unique method of engine speed control by generator lead variation. The transmission also provides electrical torque conversion and enhancement as well as regenerative breaking. Significant exhaust emission reductions were achieved operating the engine lean and in nearly steady state conditions without adversely affecting fuel consumption. The emissions, however, were not reduced to a level sufficient to meet projected standards. Further exhaust emission reductions may be possible by engine modification and exhaust gas recirculation. The electromechanical transmission is ideally suited to catalytic reactor operation. Major areas for further development are identified including refinement of the gear train, more sophisticated electrical machine designs, packaging of the electronic systems, and studies of battery life and its power density. (Author conclusions modified)

20094 APTIC NO. 38831

Gilbert, Traugott

DESULFURIZATION OF WASTE GASES AND FUEL. *(Abgas- und Brennstoffentschwefelung). Text in German. Tech. Ueberwach. (Duesseldorf), 13(2):38-41, Feb. 1972. 2 refs.*

In both coal- and oil-fired steam boilers, the concentration of sulfur dioxide in the flue gases is 88-95% of the sulfur content of the fuel. The worldwide emission of SO2 in 1937 was 35 million tons; in 1969, 84 million tons. A figure of 120 million tons is anticipated by 1980, even if the percentage of energy production from nuclear power stations increases up to seven times the 1969 level. This estimate is based on the assumption that in 1980 thermal power stations will still generate 30% of overall SO2 emissions, as in 1969. Means for reducing SO2 emissions are basically (a) desulfurization of fuels, (b) high chimneys for improved dispersion of SO2 in the atmosphere, (c) improvements in combustion technology, (d) conversion to different fuels, and (e) desulfurization of flue gases. In the U. S., three large coal-fired power stations employ for a system using a limestone-dolomite solution to desulfurize stack gases. In Japan, dry processes are being developed using activated carbon or manganese oxides as adsorbents. Without desulfurization equipment, a chimney as high as 170 m may be required. With desulfurization, its height could be reduced to 35 m unless the emissions also contain gaseous fluorine compounds, in which case a very high chimney is necessary regardless of any desulfurization methods employed.

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20095 APTIC NO. 39130

Gilbert, Theodore E.

RATE OF EVAPORATION OF LIQUIDS INTO AIR. J. Paint Technol., 43(562):93-97, Nov. 1971. 40 refs.

The rate of evaporation of liquids into air is described in an equation which is in harmony with the fundamental Knudsen equation for the maximum rate of evaporation in a vacuum. Essentially, the transmission coefficient K in the Knudsen equation is elucidated. Experimental data in support of this equation are presented. The absolute rates of evaporation into air of seven key solvents are given as measured gravimetrically. The solvents included n-butyl acetate, n-propanol, methanol, cyclohexane, benzene, toluene, and heptane. Pertinent literature on the rate of evaporation is reviewed. (Author abstract modified)

20096 APTIC NO. 39361

Godridge, A. M. and M. E. Horsley

CARBON FORMATION IN LARGE RESIDUAL-FUEL-OIL-FIRED BURNERS. *J. Inst. Fuel, vol. 44:599-606, Nov. 1971. 28 refs.*

Soot and coke particle concentrations were measured for large residual fuel oil flames and the material was examined with optical and electron microscopes. Soot particles from large burners using residual fuel oil are the same basic size as the soot from smaller gas and oil flames, which is about 0.05 micron in diameter. Thus the particles are very much smaller than wavelengths important for thermal emission and scattering of radiation can be neglected. This enables heat transfer calculations to be made for absorbing media without considering the additional complication of scattered radiation. These soot particles account for high total emissivities observed with large residual fuel oil flames. An equation is presented which relates total emissivity to soot concentration. Residual fuel oil flames also contain coke particles which can reduce plant efficiency by escaping unburned. They have size distributions that can be characterized by the Rosin-Rammler distribution with mean sizes from 30-50 micron and would not be expected to contribute appreciably to the attenuation coefficient. (Author conclusions modified)

20097 APTIC NO. 38891

Grandjean, E.

POWER PRODUCTION AND ENVIRONMENTAL PROTECTION. *(Energieproduktion und Umweltschutz). Text in German. Technica, 19(6):418-419, March 1972.*

The increasing air pollution is caused by the population increase, the technological and economical progress, and the increase of power consumption. In Switzerland the combustion of fuel oil and gasoline provides the major source of air pollution. The combustion of fuel oil mainly causes the emission of sulfur dioxide as well as nitric oxide and nitrogen dioxide; automobiles are primarily responsible for the emission of carbon monoxide. In the year 1963 the SO2 emission for the entire city of Zurich was calculated to have amounted to about 1.8 tons. A reduction of the sulfur concentration in fuel from 0.52% to 0.39% in Lausanne lead to a reduction of the SO2 concentration in the city atmosphere from 0.035 ppm to 0.017 ppm. An automobile emits about 300 to 1000 l/min exhaust gas. Apart from CO they also emit small amounts of aromatic hydrocarbons and lead.

20098 APTIC NO. 39609

Habibi, K.

AUTOMOTIVE PARTICULATE EMISSIONS AND THEIR CONTROL. *Preprint, Society of Automotive Engineers, Inc., New York and American Chemical Society, Washington, D. C., 7p., 1970. (Presented at the Society of Automotive Engineers-American Chemical Society, Joint Meeting, Midland, Mich.. Oct. 24, 1970, Paper 710638.)*

Two methods of sampling automotive exhaust particulates, a proportional and a total collection system, are briefly described and studies of exhaust lead size distribution, effect of mileage on size of exhaust lead, total particulate emissions from leaded and unleaded cars, and emission of exhaust tars are summarized. Age and mileage of the vehicle have the most pronounced effect on the size of exhaust lead particles; average diameter increased from about 1-2 micron at low mileage to over 15 micron at 28,000 mi. Under typical motorist driving conditions, about five times the volume of particulate matter was emitted with the unleaded car compared with the vehicle ran on leaded fuel. Both cars failed to meet the proposed 1975 particulate emission standard of 0.1 g/mi.; an advanced trap system based on particle growth and tail pipe cyclones is described that is capable of reducing emissions to less than the proposed standard and that effectively removes particles in a wide size range, including a 2:1 reduction in those particles smaller than 0.2 micron diameter. The numerous and complex problems in automotive particulate sampling and measurement are discussed.

20099 APTIC NO. 39521

Hanslian, Lubomir

AN ADDITIONAL CHROMIUM HAZARD IN THE SURFACE FINISHING OF METALS. *(Dalsi riziko dhromu pri povrchove uprave kovu). Pracovni Lekar. (Prague), no. 10:111-114, April 1967. 8 refs. Translated from Czech. 11p.*

During alkaline dechroming, which represents the electrolytic melting of chromium metal in a medium of soda lye, sodium chromate is generated in the bath and carried as an aerosol into the atmosphere. Aerosol concentrations in the baths equipped with slot exhaust at various elevations above the surface of the electrolyte were shown by colorimetry with diphenylcarbazide to vary from 0.16-1.09 micrograms/l when containing 4.3-12.3 g sodium chromate/l electrolyte. In an alkaline medium, spontaneous oxidation of chromium metal and chromic salts into Cr-VI compounds occurs, whereby their rate of formation and their total amount are directly proportional to the lye concentration. Acid dechroming, on the other hand, is not hazardous since only the biologically less active Cr-III, which does not have the capacity to escape into the atmosphere, is generated. (Author summary modified)

20100 APTIC NO. 39029

Honma, Hashio

EXHAUST GAS (SO2), (1) DIFFUSION OF SMOKE. *(Haigasu (SO2), (1) Kemuri no kakusan). Text in Japanese. Karyoku Hatsuden (Thermoelectric Power Generation), 23(3)247-260, March 1972. 11 refs.*

Polluting substances discharged from stacks ascend with momentum and buoyancy of the smoke itself and become diffused into the atmosphere chiefly by the atmospheric turbulance. After ascending, finally most of the pollutants begin to fall while still affected by the atmospheric diffusion phenomena, thus reaching the ground or sub-ground level leeward of the stacks. The phenomenan is typical of the diffusion of pollutants taking place in the 20-30 km range within 1-2 hr after they are emitted. In this type of short-range diffusion, chemical changes of the pollutants are so few that the diffusion can be rather easily estimated by taking into account the mechanical dilution with the atmosphere only. When the pollutants stay in the atmosphere for more than a few hours or the distance from the stack is 10 km or more, they are more likely to be affected by clouds, moisture, dust, and other substances present near the ground level during the diffusion, and thus be physically and chemically changed by the time they reach the sub-ground level. Various known calculation formulas are given to estimate or predict the diffusion of the smoke in relation to air pollution under various conditions. Correction factors are also introduced. These factors are used to correct the diffusion values obtained by the Sutton s and Pasquill s formulas according to meteorological conditions and duration of time

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they should represent. Formulas such as the Bosanquet s developed to calculate effective height of a stack are also discussed. Estimation by means of the wind tunnel test is described. According to statistics on wind directions observed at various observatories in Japan during 1951-1960, seaward wind prevailed in most of coastal cities (60% or more). In view of limited supply of low-sulfur fuel, the low-sulfur fuel can be used more effectively for pollution control when wind direction is predicted to be toward the inland area.

20101 APTIC NO. 39336

Institution of Mining Engineers (England), Specialized Section Committee on Mine Ventilation

THE ASSESSMENT OF ENVIRONMENTAL HAZARDS IN HIGH-PRODUCTIVITY MINING. *Mining Eng. (London), 130(132):772-795, Sept. 1971. 66 refs. (Presented at the Institution of Mining Engineers Federated Institutes Meeting, Colloquium on Mine Ventilation, Newcastle upon Tyne, Sept. 16, 1971; Nottingham, Sept. 29, 1971; Lowton, Oct. 14, 1971; Glasgow, Nov. 17, 1971; Cardiff, Dec. 8, 1971; Stoke-on-Trent, Jan. 10, 1972; and Doncaster, Feb. 10, 1972, Paper No. 4408.)*

The major hazards associated with the working environment of today s high-productivity coal mining are summarized, with special emphasis on their assessment and control. Firedamp or methane, dust, humidity, heat, carbon monoxide irrespirable atmospheres, fires, and spontaneous combustion are discussed. Detection methods, sources, pneumoconiosis hazard, filtration, and good ventilation are considered.

20102 APTIC NO. 38987

Iverach, David

MOTOR VEHICLE EXHAUST POLLUTION. *Aust. Chem Eng., 12(5):11-21, June 1971. 42 refs.*

Because automobile exhausts are involved in the formation of photochemical smog, the control of automobile pollution has added a new dimension to the design of internal combustion engines and has lead to a search for alternative power plants for transporation. The mechanism of formation of hydrocarbons, carbon monoxide, and nitric oxide; the effect of engine and operating variables on the concentration of these pollutants; government legislation and control techniques; and the potential of some alternative power plants are discussed. The engine and operating variables considered are mode of operation, air-fuel ratio, spark timing, valve overlap, air-fuel distribution, compression ratio, engine speed, and fuel composition. Control techniques developed to meet U. S. Federal and California legislation and general European emission limits include catalytic afterburners, exhaust manifold reactors, and modifications to carburetor or ignition systems. The use of alternative power plants is not economically justifiable at present.

20103 APTIC NO. 39349

Johnson, Kenneth L.

A PRELIMINARY REPORT: AIR POLLUTION AND THE SEWAGE SLUDGE INCINERATOR. *Air Pollution Control Association, Mid-Atlantic States Section, Proc. Air Pollut. Control Assoc., Mid-Atlantic States Sect., Semi-Annu. Tech. Conf., Wilmington, Del., 1971, p. 12-16. (Oct. 29.)*

Incineration of sludge was investigated as a potential source of air pollution emissions. The Barstow incinerator in California used the fluidized bed system to dispose of raw sludge from primary treatment. The South Lake Tahoe incinerator, also in California, burned both sludge from the primary process and residue from activated sludge units, using a multiple hearth incinerator. The Lorton, Virginia incinerator was also multiple hearth and handled primary sludge and grease. Data was collected on stack gas analyses of particulates, nitrogen oxides, sulfur dioxide, visible emissions, and major metal content, including cadmium, magnesium, silver, nickel, vanadium, and lead; input sludge analyses for heavy metals and major pesticides; and incinerator ash analyses. Based on the results, well-designed and operated sludge incinerators may well be able to achieve acceptably low emission concentrations. Some questions still remain, however, with respect to the effects of the emitted metals and pesticides on human health. The test incinerators handled essentially residential sewage loads; sludge with a significant industrial input may give different results.

20104 APTIC NO. 39267

Kaiser, Elmer R. and Arrigo A. Carotti

MUNICIPAL INCINERATION OF REFUSE WITH 2% AND 4% ADDITIONS OF FOUR PLASTICS: POLYETHYLENE, POLYSTYRENE, POLYURETHANE, AND POLYVINYL CHLORIDE. *New York Univ., N. Y., Dept. of Chemical Engineering, 85p., June 30, 1971. 5 refs.*

The effects on incinerator performance and emissions of combustion of refuse with 2 and 4% additions of plastics were investigated using a conventional muncipal type incinerator furnace disposing of refuse with additions of polyethylene, polystyrene, polyvinyl chloride, and polyurethane foam. The additional heat released during the burning of plastics did not cause any problems. Smoke emissions were not significantly increased, since sufficient excess air was present for adequate combustion. The odor concentration of the flue gas was not increased, with the exception of the presence of hydrogen chloride detected during the burning of polyvinyl chloride. The combustion of normal refuse without the presence of plastics, however, also resulted in HC1 generation. Chlorine was present in the normal refuse and in the polyurethane and polyvinyl chloride materials added; addition of the two materials resulted in slight increases of Hc1 concentration. The average concentration of nitric oxide stayed within 53.0-103 ppm, with a slight increase when plastics were added to the refuse. There was no correlation between the sulfur dioxide and cyanide concentrations and the amount or type of plastic added. The addition of plastics had little or no effect on organic acid emissions. Additional testing on an incinerator equipped with a scrubber is also presented.

20105 APTIC NO. 39152

Kaltstein, Andrej

AIR POLLUTION - ITS PHYSICAL EFFECTS - CAUSES AND REDUCING MEASURES. *(Luftverschmutzung Ihre gesundheitlichen Auswirkungen - Ursachen Abhilfemassnahmen). Text in German. Bl. Nat. Umweltschutz 52(2):36-39, April 1972.*

Air pollution caused by automobiles has quadrupled in the past two years, as determined by measurements for the area of Munich. The automotive emissions which are considered harmful to man are hydrocarbons, nitrogen oxides, carbon monoxide, lead, and fine dust. The maximum allowable concentration for NOx (0.5 ppm) is exceeded at many points in Munich. Maximum CO concentration measured in Munich was 100 ppm; such high concentrations impair the vision and alertness. Persons which are frequently in traffic situations in Munich may accumulate carboxyhemoglobin concentrations of 2-6%. The lead concentration in the larger cities of West Germany measure 5-10 micrograms/cu m. In Moscow, where leaded gasoline is prohibited, the lead content of the air is only 0.7 micrograms/cu m. Although the air pollution situation calls for immediate drastic action, the federal government has drafted an emission protection law which deserves to be called an industry protection law. The polluter is not held responsible for control or clean-up, and, even in severe cases, risks no interference from authorities.

20106 APTIC NO. 39355

Kito, Masao, Masao Ishimaru, Sei Kawahara, Takeshi Sakai, and Sachio Sugiyama

COMBUSTION OF CARBON PARTICLES GENERATED FROM LIQUID HYDROCARBONS FUELS. *Combustion Flame, 17(3):391-397, Dec. 1971. 7 refs.*

In the spray combustion of heavy fuel oil droplets, the combustion process may be considered as the successive stages of ignition, distillation, combustion of volatile hydrocarbons, and final combustion of solid particles of residual carbon. From studies of the progress of combustion of single fuel droplets, it seems that the time required fro combustion of droplets is largely occupied by that of combustion of residual carbon particles. These particles give rise to an increase of the heat transfer resistance and erosion of heat exchanger tubes by acidic adhesion, as well as air pollution by discharge from a flue gas stack. Since it is desirable to achieve combustion with as little generation and discharge of residual carbon particles as possible, it seems useful to correlate the burning of single carbon particles with the burning of a cloud of particles of known size distribution. The known distribution of size of residual carbon particles generated from liquid hydrocarbon fuels in a cloud is combined with measurements of the combustion process of individual particles to give calculated results for the burning of the cloud, and these calculations are compared with experimental results for burning of the cloud. The experimental apparatus comprised a vertical-type electric furnace, a batch fluidized-bed reactor, suction pyrometers, thermocouples, and an electronic automatic recorder.

20107 APTIC NO. 39195

Kyle, M. L., H. Shimotake, R. K. Steunenberg, F. J. Martino, R. Rubischko, and E. J. Cairns

LITHIUM/SULFUR BATTERIES FOR ELECTRIC VEHICLE PROPULSION. *Society of Automotive Engineers, Inc., New York, Proc. Intersociety Energy Conversion Eng. Conf., Boston, Mass., 1971, p. 80-95, 34 refs.*

Performance characteristics of lithium/sulfur cells were investigated to evaluate their applicability as secondary (electrically rechargeable) batteries for automobile propulsion. Laboratory investigations indicated that these cells show promise of meeting the requirements of a low-cost ($10/kW-hr), high-specific energy (200 W-hr/kg), high-specific power (200 W/kg) secondary battery. Lithium/sulfur cells, using a molten lithium halide-containing electrolyte, achieved capacity densities of up to 0.52 A-hr/sq cm (above 1 V) at a current density of 0.52 A/sq cm. These results are consistent with the specific energy and specific power goals, but the cycle life (currently hundreds of cycles) and the sulfur electrode performance require further improvement. Calculations were performed to estimate the range of a 1950 kg electric automobile powered by a 488 kg battery. Ranges of about 240 km (150 miles) for various driving cycles appear feasible if the technical problems encountered in the development of these cells can be overcome. (Author abstract modified)

20108 APTIC NO. 39603

Lear, William P. and Kenneth L. Nall

VEHICLE AIR POLLUTION - THE PROBLEM AND ITS SOLUTION. *Preprint, Society of Automotive Engineers, Inc., New York, 28p., 1970. 82 refs. (Presented at the Society of Automotive Engineers, Chicago Section, May 12, 1970, Paper 710272.)*

The internal combustion engine probably cannot be economically modified to eliminate detrimental air pollution products of combustion. Both gas turbines and steam engines are inherently low-emission vehicles which must be considered as the best alternative currently available. Total future automotive emissions by type of pollutant and high and low-emission vehicles are calculated as a function of time, and costs of enforced control of pollution from internal combustion engines are estimated for California and the entire U. S. A vapordyne power system, including steam involute expander, having very low emissions is described in detail, and a hybrid turbine-electric system is noted. Both are designed to run on kerosene but burn any combustible liquid. A public transporation system, based on a low-emission bus of completely new design, is also detailed. Several aspects of urban air pollution are discussed, including the role of nitric oxide and nitrogen dioxide in smog formation and the chemistry of combustion with application to hydrocarbon fuels. The concentration of major pollutants (carbon monoxide, hydrocarbons, nitrogen dioxide, lead, ozone, and sulfur oxides) in the U. S., and health hazards from air pollution are briefly considered. An appendix gives the mathematical basis for computation of future air pollution from motor vehicles.

20109 APTIC NO. 39764

Lee, G. K., E. R. Mitchemm, F. D. Friedrich, and R. G. Draper

FIRESIDE CORROSION AND POLLUTANT EMISSION FROM CRUDE OIL COMBUSTION. *Trans. ASME (Am. Soc. Mech. Engrs.), 94(2):154-158, April 1972. 3 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/CD-2.)*

A pilot scale research boiler was used to evaluate the corrosion and pollution potential of a western Canadian mixed-blend crude oil from the Interprovincial Pipeline. This crude oil, even when deliberately contaminated with high levels of salt, was burned successfully with moderately low excess air. In addition, problems associated with low-temperature deposits, low-temperature corrosion, and pollutant emissions were minimal. Particulate emission was low compared to typical values for residual fuel oil, and sulfur dioxide emission was, of course, proportional to the sulfur content of the crude oil. Burning with moderately low excess air practically eliminated the emission of sulfur trioxide and limited nitrogen oxides to fairly low levels of nitric oxide. High-temperature corrosion, due to either oil ash or gas-phase oxidation, was controlled by proper selection of boiler tube material. Low-temperature pump and screen tests on the as-received crude oil indicated that no pumping or screen-plugging problems should occur at temperatures above the maximum pour point. (Author abstract modified)

20110 APTIC NO. 39729

Levenets, N. P., G. A. Lopukhov, and A. N. Samarin

FUME FORMATION DURING OXYGEN BLOWING OF PIG IRON. *Russ. Met. (English translation from Russian of: Izv. Akad. Nauk SSSR Metal.), no. 5:9-11, 1968. 9 refs.*

Fume formation during the process of oxygen steelmaking was investigated in a small-scale converter with respect to the carbon content of the metal, waste gas composition, and composition of the blowing gas. The rate of fume evolution was a function of the carbon concentration of the bath and reached a maximum at about 2% carbon. Increasing the blowing rate increased fume evolution, especially at high carbon concentrations. With less that 2%, carbon, the carbon monoxide content increased rapidly and the oxygen was almost completely consumed in oxidizing the bath. A relationship was also determined between size grading of the fume and the carbon content of the metal.

20111 APTIC NO. 39576

Luebke, Dietmar

STATE OF TECHNOLOGY AND POSSIBILITIES OF DEVELOPMENT OF DRIVING SYSTEMS FOR TRACK-BOUND VEHICLES FOR REDUCTION OF ENVIRONMENTAL POLLUTION - A CONTRIBUTION TO THE ENVIRONMENTAL PROTECTION PROGRAM OF THE FEDERAL GOVERNMENT. *(Technischer*

Stand und Entwicklungsmoeglichkeiten von Antriebssystemen fuer Schienenfahrzeuge zur Minderung der Umweltbeeintraechtigung). Text in German. Glasers Ann., 96(3):67-72, March 1972. 14 refs.

The contribution of transportation to air pollution is rapidly increasing, with 40% of total urban pollution due to motor vehicles. Railways offer the most ecologically controlled means of transport, resulting essentially from the conversion to modern traction techniques. The West German Federal Railway has already spent over one billion dollars (5000 DM million) on pollution control since 1949. Railway traffic is powered by steam engines and diesel engines. In 1969, railroad diesel engines emitted 24,000 tons of carbon monoxide, 36,000 tons of nitric oxide, 8,000 tons of hydrocarbons, 8000 tons of sulfur dioxide, and 3000 tons of solid matter; emissions by steam engines amounted to 0.6 kg/100 sq m. The high NO emissions of diesel engines can be reduced through water injection, which will also decrease CO emission. Gas turbines as a power source are also on the increase, since the exhaust gases contain a lower amount of pollutants, with the exception of NO.

20112 APTIC NO. 39108

Lumley, K. P. S., P. G. Harries, and F. J. O Kelly

BUILDINGS INSULATED WITH SPRAYED ASBESTOS: A POTENTIAL HAZARD. *Ann. Occupational Hyg., 14(3):255-257, 1971. 6 refs.*

In a survey of storehouses insulated with sprayed crocidolite and amosite asbestos, the insulation was damaged because it was unprotected. Dust sampling with millipore membrane filters showed that the occupants of these storehouses could be exposed to harmful levels of asbestos dust if the insulation of fallen asbestos debris was disturbed. It is suggested that this hazard may be controlled by sealing the insulation and providing means of protecting the sealed insulation against damage. (Author abstract modified)

20113 APTIC NO. 39587

Marier, J. R.

THE ECOLOGICAL ASPECT OF FLUORIDE. *Fluoride, 5(2):92-97, April 28, 1972. 21 refs. (Presented at the International Society for Fluoride Research, Annual Conference, 4th, the Hague, Netherlands, Oct. 24-27, 1971.)*

Research results have shown that fluorides tend to be the major atmospheric pollutant involved in a situation that also involves sulfur dioxide. The possible synergism involving more than one pollutant must be thoroughly investigated since a simple additive effect would underestimate the condition if a synergism magnifies the combined effect of the two pollutants. Another example of synergism involves the magnitude of fluoride uptake in vegetation, arising from the use of fluoride-containing phosphate fertilizers. The presence of only 0.11 mg/l of available boron doubles the uptake of fluoride via the root-system of vegetation. A study determined that exposure of aquatic vegetation to 100 ppm of water-borne fluoride for 5 days increased the vegetation fluoride content 50-fold, whereas exposure to 20 ppm for 14 days increased it 38-fold. No information is available concerning exposure to lower level of water-borne fluoride for longer periods of time. The possibility that vegetation exposed to fluoric air-pollution are able to convert inorganic fluoride to the much more toxic fluoroacetate and fluorocitrate forms is considered. Recycling of the emitted fluorides for use in syntheses of useful compounds would benefit the industries and the ecosystem.

20114 APTIC NO. 39755

Marshall, W. F. and R. D. Fleming

DIESEL EMISSIONS REINVENTORIED. *Bureau of Mines, Bartlesville, Okla., Bartlesville Petroleum Research Center, Rept. Investigations 7530, 24p., July 1971. 6 refs.*

NTIS: PB 201896

Exhaust emission data on diesel engines were reinventoried. Test data on smoke, odor, and emissions of hydrocarbons, nitrogen oxides, carbon monoxide, and aldehydes are presented. Lowest emissions were obtained with a precombustion-chamber engine. Emissions from the 2-cycle direct-injection engine were within the range for the 4-cycle naturally aspirated direct-injection engines. Excluding the precombustion-chamber engine and one of the 4-cycle naturally aspirated engines tested, carbon monoxide emissions rates were about equal for all the other diesel engine types. (Author abstract modified)

20115 APTIC NO. 39453

Mason, David V.

SPRINGFIELD, OHIO AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., 7p., Aug. 1969, Office of Air Programs Pub-APTD-0840.*

NTIS: PB 206964

The results of the July 1969 emission inventory of the Springfield, Ohio, area, i.e., Clark County, are presented in tables and on a grid reference system extended from the grid system used in the Dayton emission inventory. The tables list the tons/yr of sulfur oxides, particulates, carbon monoxide, hydrocarbons, and nitrogen oxides emitted by transportation, fuel combustion in stationary sources, refuse disposal, and industrial processes; the tons/day (average, winter, and summer) of these pollutants emitted by point sources; and the tons/day emissions by grid area. Data are also presented on fuel consumption in the Springfield area.

20116 APTIC NO. 39188

Masters, Gene

PROPANE-FUELED VEHICLES CAN ABATE AIR POLLUTION. *Gas Ind., 13(7):4, 16, May 1969.*

A 1969 Ford Galaxie was converted for dual operation on propane or gasoline. In addition to reducing air pollution, the liquefied petroleum-gas carburetion system is economical and safe to operate, requires less engine maintenance, and has been proved in the field over a period of many years. Sponsored by the Western Liquid Gas Association in cooperation with the National LP-Gas Association, a fleet of LP-fueled vehicles was presented at the Clean-Air Car demonstration in Los Angeles, March 25, 1969. Hydrocarbons averaged 168 ppm and carbon monoxide 0.60% for the converted Ford Galaxie. As with all LP engine conversions, the sealed fuel flow design and automatic shutoff valves eliminate evaporation losses from tank and carburetor.

20117 APTIC NO. 39619

Maxwell, William S.

THE INCINERATOR MENACE. *A. P. C. A. News, vol. 1:7-10, Oct. 1953.*

At present, about 13% of the population of New York City is served by incinerators, with a significant saving to the City in the budget of the Sanitation Department. The main deficiencies of the incinerator are due to design, the variable character of the garbage used as a fuel, and its haphazard operation. In burning any fuel it is important to maintain correct draft, and in the construction of an incinerator it is most important that the incinerator be provided with a separate and independent flue. When firing the incinerator, the charging and ash pit doors should be kept closed to decrease the draft and the consequent carry-over of fly ash. If fly ash is excessive after such a condition, a settling chamber of proper design and size on the roof will abate the nuisance. A settling chamber is also of some help in abating odors and smoke since it kills the draft and allows slower and more complete burning. Theoretically, the installation of a gas burner or other means of auxiliary heat should raise the temperatures high enough so that combustion is complete and smokeless, and odors are destroyed.

20118 APTIC NO. 39215

McCabe, Louis C.

AIR POLLUTION BY INDUSTRIAL FUMES, GASES, AND DUSTS, Trans. AIME (Am. Inst. Mining, Metallurgical, and Petroleum Engr.), vol. 187: 971-973, Sept. 1950. (Presented at the American Institute of Mining and Metallurgical Engineers, Columbus, Ohio, Sept. 1949.)

Quantitative emission data from a number of metallurigical operations are tabulated and allowable discharge in terms of effuent-weight ratio is discussed. Quantities of particulate matter reported in analysis of stack effluents indicate the need for standards of emission. Data are representative of four types of metallurgical industry: nonferrous, steel, gray iron, and electric iron. Nonferrous operations comprise the largest group numerically, but in gross tonnage of processed material the combined steel industry is larger. Two pilot installations on open-hearth steel furnaces were completed during 1950: a venturi scrubber and electrostatic precipitator. Both types of equipment will successfully meet Los Angeles standards. The fume-discharge problem of the electric steel furnace has been solved by using a hood system which utilized a limited amount of air and discharged through a wet dynamic precipitator. Filter-type collectors are successful on the submicron fume discharge encountered in the nonferrous industry.

20119 APTIC NO. 38983

McMullen, Robert N.

LAND CLEARING AND RIGHT-OF-WAY DISPOSAL PROBLEMS. *J. Environ. Health, 34(2):211-212, 233, Sept.-Oct. 1971. (Presented at the Annual Educational Conference, 35th, Portland, Ore., June 26- July 2, 1971.)*

There are several problems to be considered with regard to open burning of land-clearing debris: wind speed, ambient temperatures, moisture content, meteorologic conditions, and size and shape of the pile to be burned. In general, the low temperature of outdoor burning increases the particulate emissions, carbon monoxide, and hydrocarbons while suppressing the sulfur oxides and nitrogen oxides. Some alternatives to open burning include disposal in a sanitary landfill, incineration in a trench, cutting and sale of marketable timber, and the use of equipment capable of chipping entire trees with subsequent by-product use of the chips.

20120 APTIC NO. 39506

Medaets, J.

DANGERS ASSOCIATED WITH THE THERMAL DRYING OF COAL. *(De gevaren verbonden aan de installaties voor het drogen van kolen). Ann. Mines Belg., no. 3:313-329, March 1967. 11 refs. Translated from Dutch. 22p. (Presented at the International Conference on Coal Refining, 5th, Pittsburgh, Pa., Oct. 3-7, 1966.)*

The increased coal temperatures that result from the thermal drying of coal accelerates the process of spontaneous combustion and may provoke distillation of the volatile matter and release of occluded firedamp. Despite the safety devices adopted and the instruction given to personnel, serious incidents and explosions have occurred. Several types of thermal drying installations are described, as well as accidents which have occurred in them. Cascade driers and vertical driers are noted. (Author summary modified)

20121 APTIC NO. 39357

Meijer, R. J.

PROSPECTS OF THE STIRLING ENGINE FOR VEHICULAR PROPULSION. *Philips Tech. Rev., 31(5/6):169-185, 1970. 15 refs.*

The contribution of the motor vehicle to air pollution is briefly considered, including statutory measures taken by the State of California and the Federal Government to control the hydrocarbons, carbon monoxide, and nitrogen oxides from automotive exhaust gases. Development of potentially cleaner engines for vehicles is being greatly stimulated by the Department of Health, Education, and Welfare. With the Stirling engine the exhaust gases are relatively clean even if fossil fuels are used in a normal--that is to say adiabatic--burner. Because of the continuous combustion of the fuel in a space surrounded by hot walls, the latitude in the choice of the air-to-fuel ratio, and the considerable freedom in the design of the burner, the amount of unburned hydrocarbons becomes virtually negligible and the amount of carbon monoxide is very low. Strong preheating of the combustion air does lead to a high flame temperature, which promotes the formation of oxides of nitrogen. However, the combination of a relatively brief residence time, lower peak temperatures than in internal combustion engines, and the continuous combustion does lead to quite a small value for nitrogen oxides. Operating variables, design criteria, and test results for the Stirling engine are discussed. Specific weight, efficiency, and other properties of the Stirling engine for vehicle application are considered, as well as further research and development. New sources of heat which are discussed include a lithium fluoride heat accumulator and a hydrogen accumulator.

20122 APTIC NO. 39770

Merian, E.

THE IMPORTANCE OF ENVIRONMENTAL PROTECTION PROBLEMS FOR THE CHEMICAL INDUSTRY. *(Die Bedeutung der Probleme des Umweltschutzes fuer die chemische Industrie). Text in German. Chimia, 26(3):115-122, March 1972. (Presented at the Swiss Chemists Association Meeting, Attisholz, Switzerland, Feb. 5, 1972.)*

General problems of environmental protection in the Swiss chemical industry, as well as related objectives for the near future, are outlined. Environmental protection represents a major concern for business management, and related requirements will be duly observed in planning. To handle the problem of environmental protection, structural changes will be necessary in Switzerland s economy. While the expenditure in Switzerland for environmental protection totaled 560 million dollars in 1970, equaling some 2.5% of the gross national product, this percentage will have to be increased to 4-6% in the years to come. The chemical industry is not the chief polluter, since contributions of industry as a whole in Central Europe to air, water, and soil pollution are 17, 50, and 8%, respectively. In view to the limited energy and natural resources, the Swiss chemical industry will consume limited amounts of energy and raw materials. Some unsolved problems concerning the toxicity, formation, and cause-effect relations of certain pollutants are briefly reviewed. Conventional pesticides should be replaced with readily degradable products. Improvement of technologies and pollution control techniques, as well as coordinated research in the environmental protection area, are some of the basic objectives for the chemical industry.

20123 APTIC NO. 38822

Mitzinger, Wolfgang

THE DEVELOPMENT OF POWER PRODUCTION, THE PLANNED SHAPING OF A SOCIALIST CULTURE IN THE DDR AND THE UTILIZATION OF SECONDARY RAW MATERIAL. *(Die Entwicklung der Elektroenergieerzeugung, die Planmaessige Gestaltung einer sozialistischen Landeskultur in der DDR und die Sekundaerrohstoffnutzung). Text in German. Neue Bergbautech., 1(11):801-808, Nov. 1971. 5 refs. (Presented at the Internationalen Kolloquiums Kraftwerkstypische Sekundaerrohstoffe, Karl-Marx-Stadt, Germany, May 20, 1970.)*

For power production, more than 90% fossil fuels are used in the German Democratic Republic, i.e., the power production is based on the combustion processes. Any combustion withdraws large quantities of oxygen from the atmosphere and returns an even larger quantity of waste gases. A 1000 MW power plant emits a waste gas volume of 150 million cu m/day.

Of the total heat supplied to a modern power plant 15% is emitted with the flue gases. Each year the quantities of waste heat rise, so that new fields for waste heat utilization must be sought. In this connection tests were carried out with greenhouses made of plastic foil and heated with such waste heat. Both greenhouses could be satisfactorily heated. This open up the new field of growing all-year round vegetables in greenhouses with the waste heat from power plants.

20124 APTIC NO. 39309

Muhlrad, D.

THE FIGHT AGAINST AIR POLLUTION CAUSED BY ELECTRO-METALLURGIC FURNACES. *(Lutte contre la pollution de l atmosphere par les fours electrometallurgiques). Text in French. Eidgenoessische Kommission fuer Lufthygiene, Zurich (Switzerland), Probleme der Luftverunreinigung durch die Industrie, p. 30-37, 1968. (Sept. 9-10.) (Presented at the Schweizerisches Treffen fuer Chemie, 2nd, Basel, Switzerland.)*

Among the various types of smoke emissions, those derived from electro-metallurgic furnace operations must be considered particularly significant as carriers of dust which can be toxic, of very small particle sizes, and remain suspended in the air. Under conditions of calm weather and temperature inversions, such particles are important in the formation of smog. Two prominent examples are the electric arc steel melting furnace and the ferro-silicon furnace of electric arc design. In the steel furnace, the size and quantity of dust particles is smallest during the melting phase of the cycle, and largest during the stage of oxygen refinement. The particles are composed primarily of iron oxides and oxides of calcium and magnesium. The waste gases are retained inside the furnace in a controlled manner by providing a small underpressure, and are periodically released through a special pipe line leading to dust removal equipment, such as electrostatic precipitators or fiber glass filtering arrangements. The gases have to be cooled, if necessary, by atomized spray water prior to entering the filters. In ferro-silicon furnaces, the particles are composed of 90% silica, the remainder is oxides of iron, aluminum, and magnesium. The average particle size is 0.3 to 0.4 micron. In some cases, the discharge of dust bearing waste gases into the atmosphere through a chimney is considered sufficient. However, recent anti-pollution regulations make it necessary to also provide for dust separation by equipment such as high-velocity venturi scrubbers, electrostatic humid precipitation, or sleeve type polyester filters.

20125 APTIC NO. 39024

Mulcahy, M. F. R.

COMBUSTION. *Coal Res. CSIRO, no. 45:47-54, Dec. 1971. 30 refs.*

Some areas of research in the field of combustion are reviewed. The research program has evolved in keeping up with changes in industrial problems, including studies on the combustion of lump fuel in fixed beds, coal combustion characteristics, heat transfer, air pollution controls, and fuel efficiency. Specific investigations on the relation between coal characteristics and their behavior in underfeed combustion, on the formation of fireside deposits in industrial furnaces, on electrostatic precipitation of fly ash, and on the fundamental mechanisms of combustion are discussed.

20126 APTIC NO. 38885

Nakagawa, Jinzo

QUANTITATIVE ANALYSIS OF PUBLIC NUISANCE IN STEEL INDUSTRIES. *(Seikogyo ni okeru kogai no teiryo bunseki). Text in Japanese. Kogai Kenkyu (Stud. Publ. Nuisance), 1(3):38-50, Jan. 1972.*

Environmental damage caused by steel industry operation are discussed. In the area of air pollution, sulfur oxides are emitted mainly from the ore sintering process, various heating furnaces, the thermal electric power plant, coke furnace gas, and furnaces using crude oil. Present countermeasures include use of low-sulfur ore (sulfur content 0.06 to 0.07%); restrictions on the use of sulfuric acid residue; use of low-sulfur coal (0.6 0.7% content) and low-sulfur fuel (1.0 - 1.2% content for furnaces, and 1.3% for thermal power plants); collectivization of stacks; and improvement of effective stack height from the present 120 m to 200 m. Increasing use of desulfurization pellets and the roasting of raw material on isolated islands are possible future control strategies. The transportation of malacon powder ore in slurry form through a pipe system is under consideration. By this method, 2.3% sulfur content is said to decrease to 0.3% through magnetic transportation and specific weight mine transportation. The use of liquid natural gas and liquid petroleum gas is also being promoted. More than half the operations of steel works create dusts, including coal storage; coal and coke transportation and loading; ore crushing; coal dressing; and sintering, coke, lime, rotary, and blast furnaces. Dusts are controlled by water spray, surface coating, dust cover, and dust collection equipment. Efforts must be made to control dusts at the storage and transportation stages.

20127 APTIC NO. 39010

Nakamura, Etsuro, Katsuya Koguchi, and Tetsuo Nakayama

BASIC STUDIES ON THE PRODUCTION OF POLYMETHYLBENZENES. *(Poriarukirubenzen rui no seizo ni kansuru kisoteki kenkyu). Text in Japanese. Kogai Shigen Kenkyusho Hokoku (Rept. Pub. Nuisance Resources Res. Inst.), no. 3: 1-127, March 1971. 40 refs.*

The percentage and the composition of C6 to C10 aromatics in the various petroleum products (crude oils, naphthas, reformates, naphtha-pyrolysis gasolines and catalytically cracked gasolines) were studied. The method of analysis of C6 to C10 aromatics was basically a combination of fractional distillation, absorption with silica gel, and gas chromatography at temperatures of 40 210 C. Reformates and naphtha-pyrolysis gasolines were good for production of BTX; reformates were also good as raw materials for production of trimethylbenzenes and C10 alkylbenzenes, and catalytically cracked gasolines were not suited as raw materials for the production of alkylbenzenes. In order to produce polyalkylbenzenes, heavy naphthas and kerosenes from various crude oils were reformed using a platinum alumina reforming catalyst. From the data obtained, the relationship between the operation conditions and the yields or composition of aromatics was investigated. The relationship between the boiling range of naphthas and yields of aromatics of reformates was confirmed. The experiments confirmed that the compositions of methylethylbenzene, trimethylbenzene, and tetramethylbenzene in reformates were steadied under the same operation conditions, regardless of the boiling range of naphthas. The composition of C8-C10 aromatics and C11, C12 naphthalenes obtained from kerosenes agreed with each other. As basic studies for separation by fractional crystallization of durene, the solubilities of durene in multi-component systems were studied. The solubility and the super-saturated solubility of durene in the multi-component sytems of C10 and C11 aromatics in the catalytic reformates of heavy naphthas were determined. The solid-liquid equilibrium relationships between the three isomers of tetramethylbenzene were determined. Furthermore, the solubilities of durene were determined in multi-component systems of aromatic and paraffinic hydrocarbons having boiling points similar to that of durene in the catalytic reformate.

20128 APTIC NO. 39583

Nenning, F. J.

BUSINESS REPORT OF 1970 OF THE FEDERAL ASSOCIATION FOR OIL AND GAS FIRING E.V. *(Geschaeftsbericht 1970 des Bundesverbandes Oelfeuerungen und Gasfeuerungen E.V.). Text in German. Bundesverband Oelfeuerungen und Gasfeuerungen e.V. (West Germany), INTHERM, Int. Fachmesse Oelfeuerung*

Gasfeuerung, 11th, Stuttgart, West Germany, 1971. p. 93-102. (March 3-7.)

The general situation in the oil and gas firing sector is outlined. The Federal Association for Oil and Gas Firing, taking initiatives in the field of pollution control, is a member of the Federal Advisory Board on Environmental Protection. According to regulations in Bad-Wuerttemberg and North Phine-Westphalia, West Germany, units causing no emissions from conventional heating are not required to use long-distance heating systems. Recent investigations revealed the possibility to guarantee emission-free operation of oil firings. According to statistical data, some type of central heating was installed in 32% of all homes in 1968. Now, some 7.5 million units have central heating, compared to 800,000 in 1960. In 1970, about 54% of a total light fuel oil volume of 43.6 million tons were used for domestic heating. The major part of the 26.3 million tons of heavy fuel oil, consumed in 1970, used by industry and power plants. The use of heavy fuel oil, primarily for emulsion burners, is of increased importance.

20129 APTIC NO. 39496

Newhall, H. K. and S. M. Shahed

KINETICS OF NITRIC OXIDE FORMATION IN HIGH-PRESSURE FLAMES. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 381-389. 8 refs. (Aug. 23-29.)*

The kinetics of nitric oxide formation under conditions related to those occurring in internal combustion engines were investigated. Spectroscopic techniques were used to directly record the time rate of formation of NO in the immediate vicinity of a flame front propagating through a high-pressure combustion vessel. The results presented represent initial experiments for which hydrogen and air were employed as fuel and oxidizer. Similar work with hydrocarbon-air and hydrocarbon-air-diluent mixtures is now in progress. Measurement of spectral absorption due to the (0,0) gamma band of NO yielded formation rates for NO in the vicinity of the flame front and showed that NO formation occurs primarily in the post-flame gases. Under these conditions, formation rates are accurately predicted by the two-step mechanism N2 + 0 in equilibrium with NO + N and 02 + N in equilibrium with NO + 0, with oxygen-and nitrogen-atom concentrations set equal to their chemical equilbrium values. (Author abstract modified)

20130 APTIC NO. 39388

Ohigashi, S., Y. Hamamoto, and S. Tanaba

MEASUREMENT AND EFFECT OF THE AIR SWIRL DURING THE COMBUSTION IN A DIESEL ENGINE. *(Messung und Wirkung des Dralles bei der Verbrennung in einem Dieselmotor). Text in German. Motortech. Z. (Stuttgart), 33(4):139-145, 1972. 15 refs.*

The gas flow rates in the cylinder of a four-stroke diesel engine were measured by means of an electric discharge method to determine the effect of the air swirl ofn the combustion and the smoke density. By increasing the number of the nozzle holes, both high output and low smoke density was obtained with low air swirl speed. The gas flow rates in the cylinder were higher during combustion than during idling over the suction stroke and the first part of the compression stroke, while they were almost identical at the end of the compression in both cases. Thus, the gas speeds immediately before ignition can be evaluated from idling tests. Both increased pressure and smoke density occurred with decreasing air ratio.

20131 APTIC NO. 39563

Owen, Mark B.

SLUDGE INCINERATION. *J. Sanit. Eng., Div. Proc. Am. Soc. Civil Engrs., vol. 83:1172/1-1172/27, Feb. 1957. 7 refs.*

Sewage sludge may be classified as a low rank fuel. In fuel terminology, sewage solids, fresh or digested, contain higher fractions of volatile combustible matter and less fixed carbon than any of the coals, lignite, or peat. Consequently sludge burns with much flame and appreciable heat. The fundamentals of the combustion of coal and the basic elements of furnace design required for optimum combustion are applicable to the burning of sludge. These principles are incorporated in the multiple hearth furnace, resulting in a system which induces the practically complete combustion of sludge. The design and operation of multiple hearth furnace is discussed, and thermal calculations presented for preparing a heat balance applicable to such a furnace. Operating data from a mulptiple hearth furnace indicate smokeless stack gases. Evidence to date indicates that the wetter the sludge feed, the cleaner the exhaust gas. Other variables affecting complete combustion are noted. (Author abstract modified)

20132 APTIC NO. 39786

Parsons, Ray S.

CNG--A NATURAL AUTO FUEL FIGHTS POLLUTION. *Am. Gas. Assoc. Monthly, 54(5):4-7, May 1972.*

In 1967, Southern California Gas Company and Pacific Lighting Service Company, subsidiaries of Los Angeles-based Pacific Lighting Corporation, initiated a research and development project to investigate the use of natural gas as a motor vehicle fuel for air pollution abatement purposes. The result was development of a dual-fuel system, which permits operation alternately on natural gas or gasoline. The system has since been certified by the California Air Resources Board, and the federal government s General Services Administration plans to convert up to 1400 fleet vehicles in locations throughout the country. The basic design of the fuel system has a fuel line connecting the compressed natural gas tanks, normally located in the rear portion of the vehicle, to a regulator assembly in the engine compartment. The regulators reduce the gas pressure and feed the fuel into a specially designed gas-air mixer located atop the conventional carburetor. Solenoid switches, one on the gasoline system and one on the CNG system, are activated by a lever in the passenger compartment.

20133 APTIC NO. 38915

Perry, Harry and Harold Berkson

MUST FOSSIL FUELS POLLUTE? Tech. Rev., 74(2):34-43, Dec. 1971.

Environmental problems are created at each stage of the production, upgrading, transportation, and utilization of fuels. Opportunities to channel the environmental effects associated with fuel consumption into more useful outlets depend on a number of factors, of which scale is the primary. Almost without exception, the solution of preference is one which turns waste into a useful resource. Mine and preparation plant wastes, fly ash utilization, petroleum wastes from petroleum production, gaseous wastes from petroleum and natural gas, coke oven gas, sulfur from the fuels of the future, utilization of waste heat, agricultural applications, applications to aquaculture, and urban and industrial opportunities are considered. Despite all these possible beneficial uses of waste materials which arise as by-products in the consumption of fossil fuel, there remains the inexorable fact that the total amount of waste produced is greater than can be used. Thus, intense efforts must be made to improve our management of energy conversion. The technology of fuel processing must be improved, as well as combustion and energy conversion. Electricity consumption must be reduced, cooling facilities increased, and more applications must be developed for other by-products of energy production.

20134 APTIC NO. 39606

Pyke, Donald L.

FORECASTING TECHNOLOGY IN POLLUTION CONTROL. *Preprint, American Management Assoc., New York, 27p., May 1970. 8 refs. (Presented at Environmental Pollution -- A Decade for Action, New York, May 25-27, 1970.)*

Four types of techniques available to planners and managers for forecasting the effect of control measures are extrapolative (what are the trends?) explicative (what must be done to achieve a specific objective?), and correlative (how do the options compare?). Trend analysis, although reliable and widely used, depends upon the availability and reliable data. The only formal tool designed specifically for speculative forecasting is the morphological method, a multi-dimensional matrix approach to the solution of an exactly formulated problem. It requires that all possible solutions to every parameter of the problem be analyzed and evaluated, thus minimizing the likelihood that a promising solution will be overlooked. A less formal but widely used technique is that of conjecture by the expert. Still another technique is the Delphi method; a modification of this method was discussed. The most widely known of the explicative techniques are the Program Evaluation and Review Technique and the Critical Path Method. Both of these employ logic networks, primarily as a planning mode. However consideration of each alternative is difficult and lacks quantitative bases for comparison. This deficiency is overcome by the use of correlative forecasting. The cross-impact matrix method was developed for analyzing the relationship between events forecast by Delphi and/or other techniques. A matrix is used to study the cross-impact of each event on the probability of occurrence of all others in the set. Statistical techniques are then employed to adjust probability estimates for internal consistency.

20135 APTIC NO. 39685

Reid, George W. and Tien-Sheng Yang

SEWER SLIMES CAUSE ODORS. *Wastes Eng., 30(9):494-497, Sept. 1959. (Presented at the Texas Water and Sewage Short School, 1959.)*

Pilot plant studies were conducted to study odor generation in sewer lines and flow reductions that accompany the development of slimes on conduit surfaces under conditions of low flow. Slime odors were determined by the zinc acetate sulfide method. Results showed that with partial flow, under proper ventilation, odors emanating from sewers are caused by slime, not sewage. Slime growth tends to be unimolecular and to follow a geometric curve, and, at low sewage flows, reduces sewer flow capacity and velocity. However, slime growth decreases as sewer velocity increases, even if the flow handled is increased. Sulfides produced by the slime increase with time and with slime quantity There is a balance point between the cohesive force produced between pipe surface and slime layers, and the tractive force produced between the slime layers and the sewage flow. The relationships among sewage, slimes, septicity, and odor production are reviewed, including anaerobic processes, redox potential, and primary and secondary slimes.

20136 APTIC NO. 39122

Risser, Hubert E.

FOSSIL FUEL SUPPLIES AND FUTURE ENERGY NEEDS. *Trans. Am. Geophys. Union, 52(11):763-767, Fall 1971. (Presented at the American Geophysical Union, Annual Meeting, 52nd, April 1971.)*

After decades of growth, in which the prime concern was that of obtaining fuel at minimum cost, the utilities were suddenly confronted with a problem of fuel availability. Part of the problem arose when utilities and other consumers abruptly attempted to shift to natural gas to comply with newly-imposed sulfur emission standards, only to find that not enough natural gas was available to provide even for growth in demand in traditional uses; and in most cases efforts to shift to low-sulfur residual oil or low-sulfur coal met with similar results. Production and consumption patterns for gas, oil, and coal are discussed.

20137 APTIC NO. 39011

Roder, H.

WRAPPINGS AND ENVIRONMENTAL PROTECTION. *(Verpackung und Umweltschutz). Text in German. Allgem. Prakt. Chem. (Vienna), 23(1/2):15-20, 1972. (Presented at the Osterreichische Inst. fuer Verpackungswesen im Rahmen der Vortragsreihe Verpackung, June 8, 1971.)*

Wrappings are disposed with solid waste either by dumping, composting, or incineration. In Austria, 12% of the refuse is burned in incinerators, 67% is dumped uncontrolled, 20% goes into sanitary landfills, and 1% is composted. Incinerators do not pose a special problem in connection with air pollution. Although hydrogen chloride and sulfur dioxide are produced at the combustion of refuse, the quantities are negligible compared to those emitted by power plants and by the individual domestic heaters. The Federal Republic of Germany presently has 30 incinerators burning about 4 million tons of domestic refuse annually. The incinerators produce a total waste gas quantity of 20 billion cu m/a. Apart from a large quantity of water vapor, these waste gases contain 2.5 million tons of carbon dioxide, 11.500 tons of SO2, and 8000 tons of HCl. (P. 19 directly concerns air pollution.)

20138 APTIC NO. 39160

Rossie, John P., Edward A. Cecil, Paul R. Cunningham, and Clarence J. Steiert

ELECTRIC POWER GENERATION WITH DRY-TYPE COOLING SYSTEMS. *Proc. Am. Power Conf., vol. 33:524-533, April 1971. 1 ref.*

The ejection of turbine exhaust heat directly to the atmosphere by the use of closed air-cooled heat exchangers appears to offer the most promising solution as an alternative to either the once through system, which adds heat to a natural body of water, or the evaporative cooling tower, which requires large amounts of makeup water. Besides the avoidance of possible problems of thermal pollution due to electric generating processes, the use of dry-type cooling systems will permit the construction of large mine-mouth generating plants in areas where there are large deposits of coal or lignite but which lack sufficient local water supplies for the makeup requirements for evaporative cooling means. Dry cooling system and turbine performance are discussed, as well as economic optimization of the system. Power production costs from dry-type and evaporative-type cooling systems are compared. The economic selection of a dry-type cooling system is a complex problem involving the interrelation of the turbine efficiency and loss of capability at varying back [illegible]sure and the heat rejection characteristics of a dry cooling tower with changing heat loads and ambient air temperatures, as well as many other factors.

20139 APTIC NO. 39635

Routschka, G., Ch. Buttgereit, and U. Berger

FLUORINE CONTENT OF REFRACTORY CLAYS AND FLUORINE EMISSION DURING FIRING OF FIRE-CLAY PRODUCTS. *(Der Gehalt an Fluor in feuerfesten Tonen und Schamotte und die Beeinflussung der Fluorabgabe beim Brand der Schamotteerzeugnisse). Text in German. Sprechsaal Keram. Glas Email Silikate, 103(20):901-906, Oct. 2, 1970. 10 refs.*

The influence of different factors on the final fluorine content in refractory clays was studied. During firing, 40% of the total (0.03-0.06%) fluorine content is volatilized. Fluorine removal starts at 400-500 C and is intensified with increased temperature until sintering processes start. High sulfur dioxide concentrations and mainly water vapor in the atmosphere have enhancing effects. The volatilization during firing is influenced by the sintering of the raw material and the porosity. Fluorine removal is additionally influenced by both shape and wall thickness of the products. The removal from the near-surface layer, at a temperature of 900-1000 C, is more intense than from the core, where it occurs at 1200 C. The fluorine removal is considerably less intense in production than in experimental firing.

20140 APTIC NO. 38732

Schlesinger, M. D. and Hyman Schultz

AN EVALUATION OF METHODS FOR DETECTING MERCURY IN SOME U. S. COALS. Bureau of Mines, Pittsburgh, Pa., Pittsburgh Energy Research Center, RI-7609, 11p., 1972. 6 refs.

Mercury exists in coal in minute quantities, but the large tonnages of coal consumed could represent relatively large amounts of mercury entering the atmosphere. Reliable analytical methods, therefore, are necessary for the determination of mercury content in United States coals. Several laboratory techniques, including dissolution and atomic absorption, combustion and atomic absorption, neutron activation analysis, single silver amalgamation and atomic absorption, and double gold amalgamation and atomic absorption, are reviewed. All of the methods require careful manipulation prior to use to prevent loss or mercury contamination. In the samples analyzed, mercury content ranged within 0.05 + or 0.01 to 0.41 + or - 0.06 ppm. (Author abstract modified)

20141 APTIC NO. 39580

Schmidt, Hans Wilhelm and Hans Joachim Henrici

FUNDAMENTALS AND METHODS FOR THE PURIFICATION OF SYNTHESIS GAS. *(Grundlagen und Verfahren der Reinigung von Synthesegas). Text in German. Chemiker Ztg. (Heidelberg), 96(3):154-163, March 1972. 7 refs.*

Synthesis gases pass through several steps between gas generation and synthesis, including carbon monoxide shift conversion, removal of carbon dioxide, and, sometimes, removal of hydrogen sulfide and carbonyl sulfide. The removal of acid gas components by steam reforming, partial oxidation at medium pressure with heat recovery in a waste heat boiler, and partial oxidation at high pressure with quench are examined with respect to the physico- chemical properties of the solvent, absorption equilibria, rate of mass transfer, and the gas absorption process for the production of ammonia and pure hydrogen. For the removal of H2S and COS in presence of CO2, the Rectisol-process was developed. The gas is cooled to -15 C and washed with methanol. The H2S and COS are reduced to less than 0.1 ppm. The sulfur-laden solvent is regenerated and subsequently used for the removal of CO2. The high pressure gasification differs from the medium pressure gasification by the simultaneous removal of the sulfur compounds and CO2; COS does not pose any problem since it is hydrolyzed to a large extent at the high temperature conversion. At the joint separation of sulfur and CO2, the sulfur must be separated from the CO2 before it can be discharged into the atmosphere. This can be done by oxidation with air in activated coal beds.

20142 APTIC NO. 38861

Schmidt-Pathmann, Wilfried

TUBE FURNACE FOR STEAM REFORMING PROCESS. *(Roehrenoefen fuer den Steam-Reforming-Prozess). Text in German. Energie Tech., 24(3):95-101, March 1972. 8 refs.*

At the steam reforming process, a mixture of evaporated hydrocarbons, superheated steam and preheated air (if necessary) is converted in the tube furnace to crude synthesis gas in the presence of a suitable catalyst, at high temperatures and corresponding pressures. Because of the high temperatures of up to 900 C of the flue gases, their heat content suffices for preheating the raw material to between 450 and 550 C and for production of the necessary steam and for preheating the combustion air to between 200 and 300 C. The flue gas waste heat exchangers are comparable in design and construction to the conventional steam boiler plants. The design of steam-reformer furnaces is discussed in detail.

20143 APTIC NO. 38909

Seizinger, Donald E. and Basil Dimitriades

OXYGENATES IN EXHAUST FROM SIMPLE HYDROCARBON FUELS. *J. Air Pollution Control Assoc., 22(1):47-51, Jan. 1972. 6 refs.*

A study was undertaken to identify and estimate the levels of oxygenated hydrocarbon derivatives in exhaust from simple hydrocarbon fuels, with the hope that this information ultimately will yield estimates of the relative levels of various classes of oxygenates in exhaust from full-boiling-range gasolines. Identification and measurement of oxygenates in exhaust from the simplified fuels were accomplished using gas chromatography in conjunction with time-of-flight mass spectrometry. The analytical procedure involved concentration of the exhaust organics, followed by a two-stage chromatographic separation of the resultant mixture of oxygenates and hydrocarbons. Identified oxygenates in exhaust from nine test fuels included saturated and unsaturated aldehydes, ketones, and alcohols, as well as ethers, esters, and nitroalkanes; analytical data on organic acids were inconclusive. Of the identified noncarbonyl oxygenates, phenols, cyclic ethers, and nitromethane appear to be relatively the most abundant. (Author abstract modified)

20144 APTIC NO. 39140

Shaw, F. M.

IRONFOUNDRY AIR POLLUTION IN THE UNITED KINGDOM. *Brit. Foundryman, 65(3):90-105, March 1972. 20 refs.*

The acts, regulations, recommendations, and directives affecting iron foundries in England are summarized. Emissions from iron foundry processes and control methods are also examined. Legislation controlling iron foundry air pollution includes the Public Health Act of 1936, the Clean Air Acts of 1956 and 1968, the Alkali Act of 1906, regulations issued under the Clean Air Acts, and recommendations issued by the Ministry of Housing and Local Government. Cupola gases contain grit, dust, carbon dioxide, nitrogen, carbon monoxide, and sulfur dioxide. The major constituents of cupola dust are silicon dioxide, iron oxides, calcium oxide, zinc oxide, aluminum oxide, manganese oxide, and sulfur. To reduce emissions from cold blast cupolas, wet arresters, increased discharge heights, and stack gas combustion must be incorporated as specified by regulations. High efficiency cyclones, electrostatic precipitators, and fabric filters for dust collection may also be used. Projected costs and power consumption are computed for cupola gas control methods; hoods and scrubbers for electric furnaces; high energy scrubbers for rotary, air, and reverbatory furnaces; spray cleaners, fans, and fabric filters for clay-bonded sand plants; special combustion chambers to reduce smoke; and spray cleaners, exhaust systems, and fabric filters to remove dust from fettling and cleaning operations. The efficiency, operation, and advantages of the control methods are reviewed.

20145 APTIC NO. 38768

Sigal, I. Ya., A. V. Markovshii, N. A. Gugevich, and S. S. Nizhnik

FORMATION OF OXIDES OF NITROGEN IN BOILER FURNACES. *Thermal Eng. (English translation from Russia of: Teploenergetika), 18(4):86- 90, April 1971. 8 refs.*

As determined by theoretical calculations and experimental investigations, flame temperature uniquely affects the yield of nitrogen oxides in boiler furnace exhaust. The maximum temperature in the furnace depends on the excess air factor, conditions of intermixing of fuel with oxidant, and ratio of water-walled area to furnace volume. A 170-ton/hour boiler discharges 2.2 tons of nitrogen oxides/day and a 950-ton/hour boiler (with a furnace having a throat) discharges 57 tons. On the average, the discharge of nitrogen oxides in operation on coal is 20% higher than in operation on gas because the excess air factor with coal is higher. Measures for decreasing nitrogen oxides emissions from power stations must include a possible decrease in temperature and excess air factor in the combustion zone.

20146 APTIC NO. 39005

Sirola, Josip

FUEL AS A FACTOR IN INTERNAL COMBUSTION ENGINE EMISSIONS. *(Gorivo kaofaktor emisija motora s unutrasnjim izgaranjem). Text in Serbo-Croatian. Nafta (Zagreb), 22(8):687-696, Aug. 1971. 6 refs.*

The differences of the chemical-reduction and the chemical-oxidation type of urban air pollution by motor vehicle emissions are discussed. The findings of several American and British studies, carried out in the last 7 yrs, on the effect of the composition of motor fuels on the composition of gases emitted by Otto and diesel internal combustion engines are discussed. In the U.S.A., the concentrations of hydrocarbons in motor vehicle emissions are the principal emissions; in Europe the concentrations of carbon monoxide, nitrogen oxides, sulfur dioxide and smoke are of primary interest. Gasoline of lower volatility give lower emissions of hydrocarbons. Gasolines of standard volatility can significantly lower the smog potential, if olefins are eliminated from their light fractions are replaced by other types of hydrocarbons. Varying the concentrations of aromatic and alkylic hydrocarbons while keeping the octane number constant does not lead to an increase of the photochemical reactivity of the exhaust gases. Propane as a motor fuel has emissions with the lowest concentration of hydrocarbons and the lowest photochemical reactivity. While it is known that the exhaust gases contribute 67%, the motor crankcase contribute 25%, the fuel tank gives 6%, and the carburetor gives 2% to the total emissions of a European motor vehicle, no pertinent air pollution data nor in formation regarding the relation between compositions of motor fuels and vehicle emissions in gasoline-fueled two-stroke cycle engines are available in literature.

20147 APTIC NO. 39123

Snell, P. A. and H. B. Bassett

ELECTRICITY FROM NATURAL NORTH SEA GAS. *Gas World, 174(4553): 347-351, Nov. 20, 1971. (Presented at the Institute of Gas Engineers, Midland Section, England, 1971.)*

With the Central Electricity Generating Board anxious to examine the potential of North Sea gas as a new source of energy for electricity generation, the Hams Hall Power Station was a natural choice for the conversion to natural gas. The type of burner installed at Hams Hall gives incomplete mixing of fuel and air before combustion. Thus some of the gas is pre-heated giving thermal cracking of the gas. This process results in the formation of carbon particles which cause the flame to become luminous and yellow rather than blue. Tests show the emissivity of the gas flame to be 0.60 compared with a figure for the coal flame of 0.75. Analysis of the pattern of heat flux distribution in the furnace shows that the heat radiation is much more evenly distributed when firing gas. This combined with the much cleaner furnace walls resulting from gas firing, has meant that the boiler final steam temperatures have remained well under control. Conversion, pipeline construction, noise reduction, dust storms, monitoring cells, and detector probes for leaks are discussed. Cyclone type scrubbers are used to control the dust problems. Design criteria and operations are described. Pressure problems are mentioned.

20148 APTIC NO. 39726

Sorenson S. C., P. S. Myers, and O. A. Uyehara

ETHANE KINETICS IN SPARK-IGNITION ENGINE-EXHAUST GASES. *Combustion Inst., Pittsburgh. Pa., Symp. (Int.), Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 451-459. 17 refs. (Aug. 23- 29.)*

A kinetic reaction model for the reaction of ethane in spark-ignition engine-exhaust gases was constructed, based on mechanisms and rate constants currently available in the literature. The model consists of 33 elementary chemical reactions involving 20 chemical species and was tested by comparing calculated and experimentally measured species concentrations resulting from a step increase in the ethane concentration of isothermal, steady-flow, hydrocarbon-free exhaust gases. For the range of conditions, 950-1000 K, 1.2%-3.6% oxygen, and 700-1400 ppm ethane, good agreement was obtained between experimental and calculated concentrations of the major species, ethane, ethylene, carbon monoxide, and formaldehyde. The agreement between experimental and calculated results indicate that reacting hydrocarbons may have an adverse effect on the oxidation of carbon monoxide. (Author abstract)

20149 APTIC NO. 39178

Suzuki, Takeo

SUMMARY OF THE PROBLEMS IN ODOROUS AIR POLLUTION IN JAPAN. *Preprint, Environmental Protection Agency, Washington, D. C., 9p., 1971. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Due to the lack of city planning, many people in Japan still live in industrial areas and suffer from the direct influence of industrial activity. Odors emitted by fish meal plants, plastics processing plants, night soil plants, and incinerators are particularly troublesome. The dispersion of odors from large plants, e.g., petrochemical plants, oil refineries, and kraft pulp mills, also adds to the problem. Very little progress has been made in odor investigations or measurements. Olfactory methods have been employed only in evaluating odor level, with no studies directed toward the dose-resonse relationship. Motivated by public action, an Odor Control Law is now under debate. The results of an odor threshold study are briefly described and statistics of complaints of environmental pollution received by the Japanese government from 1966 through 1969 are included. (Author absract modified)

20150 APTIC NO. 39768

Takens, W.

PREVENTION OF AIR POLLUTION. *(Voorkoming van luchtverontreiniging). Text in Dutch. Gas (The Hague), 92(3):83-94, March 1972. 1 ref.*

A calculation method for the formation of nitric oxide from combustion, as a function of different factors, is described with special regard to gas firings. Based on simplified reaction mechanisms, the process of the NO formation is described mathematically, by introducing gas technical parameters such as equipment load, hearth load, gas modulus, impulse output, maximum flame temperature, hearth end temperature, mean temperature of combustion gases, and oxygen content at the end of the hearth. A formula is given for the rate of NO formation in humidified air with different percentages of carbon dioxide. The formation of NO was more intense in the presence of CO_2, while the latter was dependent on the oxygen concentration. Relationships between oxygen concentration, temperature, and retention time in laminar and turbulent flames were investigated, and their dependence on both load and gas modulus was determined. Maximum NO formation occurred above the flame top. Oxygen-time curves for different loads and gas moduli, as well as curves for NO formation as a function of initial NO production and hearth temperature were determined. The NO formation was dependent on temperature, relatively stable oxygen concentration, varying NO concentration and time. Very low excess air coefficients (0.8%) caused maximum NO formation, and the latter was strongly affected by the hearth temperature at low excess air coefficients, as well as by the flame temperature. The NO formation in gas firing equipment is also influenced by burner design, surface catalysis, preheating, heat radiation, and type of fuel. The NO formation can be effectively controlled by applying a small flame, and reducing excess air at high temperatures. Guidelines for designing fossil-fuel equipment are outlined.

20151 APTIC NO. 39610

Taliaferro, Harold R., Lawrence T. Wright, and Russell C. Mallatt

GASOLINE FOR REDUCING AUTOMOBILE POLLUTION. *Preprint, American Assoc. for the Advancement of Science, Washington, D. C., 29p., 1970. 9 refs. (Presented at the American Association for the Advancement of Science, Annual Meeting, 137th, Chicago, Ill., Dec. 26, 1970.)*

Regular use of lead-free gasoline, either in new cars or cars which have used leaded gasolines, reduces unburned hydrocarbons in the exhaust and eliminates the exhaust of lead-containing particulate. A test of cars in commuter driving service and a survey of drivers by a marketing research firm have yielded maintenance cost savings for unleaded gasoline users in the range of 2 to 5 cents/gal of gasoline purchased. Exhaust valve recession can be demonstrated when some current engines are operated long distances at very high speed and load on unleaded gasolines. Valve recession is minimized by the addition of a phosphorus-containing additive and several refiners are using this additive. Critics of the new unleaded gasolines have claimed they contain more aromatics than the current leaded premium and regular gasolines and that these aromatics yield exhaust with greater smog-forming potential. However, analyses reveal that they are similar in aromatic content to the current leaded gasolines. The extent to which changes in gasolines will be required in the future to reduce emissions from new and used cars is not clear. However, both gasoline volatility and hydrocarbon-type composition, which are now of concern, will be of less importance in the future as more efficient evaporation loss control and exhaust treatment devices are installed on new cars. (Author abstract modified)

20152 APTIC NO. 38878

Teoke, Geza

FIGHT FOR A PLEASANT ENVIRONMENT, PART I. *(Kuzdelem a kellemes kornyezetert, I. resz). Text in Hungarian. Energia Atomtech. (Budapest), 24(12):473-484, 1971. 10 refs.*

General ecological problems are outlined with special regard to rising energy requirements and air pollution problems. Maximum allowable concentrations have been established for 31 air pollutants in Hungary. Increased production in farming, forestry, and fishery may be expected due to the greenhouse effect from increased carbon dioxide production. A total of 9800 tons of carbon monoxide was emitted from automotive exhaust in Budapest in 1970. The oceans account for 5% of the total CO formed in combustion processes, according to recent findings. The importance of low-sulfur fuels is exemplified by New York City, where sulfur dioxide emissions dropped from nearly one million tons in 1966 to 379,000 tons in 1970. Catalytic waste gas desulfurization and fluidized-bed combustion are suggested to control emissions. For nitrogen oxides, a level of 250 ppm is highly realistic. A U. S. forecast for power-plant generated emissions for the period ending 2020 is given. A correlation spectrometer and an instrument for continuous SO2 concentration measurements are described, and the use of an IBM 1800-type computer in air pollution monitoring is noted. The importance of long-distance heating systems is emphasized. In Hungary, 19% of the total heat requirement was filled by such plants in 1970. Long-distance heating has been planned for northern Budapest.

20153 APTIC NO. 38819

Terada, Kiyoshi

FUELS, COMBUSTION, AND KILNS. *(Nenryo, nensho oyobi chitsuro). Text in Japanese. Seramikkusu (Ceramics), 6(5):307-311, 1971.*

The relationships between the combustion of fuels in ceramic kilns and soot are discussed. The composition of the combustion gas in a kiln is not necessarily the same as that in the flue. The combustion gas from a ceramic kiln contains, in addition to soot created in the combustion of fuels, dusts and gases created by the materials treated in the kiln, carbon monoxide, soot dust, sulfur dioxide, dust particulates, volatile materials in the treated materials such as lead or alkali, and special soot such as ammonium chloride. When the flames are suddenly cooled on the surface of a low-temperature material, soot is created on the surface of the material and carbon monoxide and hydrogen are emitted. When gas fuel or liquid fuel sucks in a large amount of cool air, the flames are drastically cooled. The thin film of soot formed on the surface of the material has a low heat conductivity and it lowers the heat capacity of the kiln. This sucked air is called false air. The quantity of false air may be calculated simply and accurately by analyzing combustion gas, and by analyzing the gases at various places in the furnace where false air is most likely to enter; the exact locations and amounts may be measured and calculated, and actual control and prevention method may be devised.

20154 APTIC NO. 39300

Thelen, Edmund

TREATMENT OF ODORS AS AIR CONTAMINANTS. *Air Repair, 1(4):47-49, May 1952.*

Sources of odors in a redevelopment area of Philadelphia were determined and recommendations made for their abatement. Chemicals responsible for odors can be dealt with scientifically as air contaminants subject to routine regulation and abatement methods. Specifically, odoriferous chemicals were frozen out of rendering plant cooker effluvia and analyzed by infrared spectroscopy and microchemical analyses. Regardless of charge stock, the effluvia contained sulfides, ammonia, and aldehydes. Hence, a simple field detector containing indicators for these chemicals was built. Odors from virtually all other sources can be collected and analyzed by these methods. Community planning and treatment of odors are discussed.

20155 APTIC NO. 39135

Trott, P. E., W. H. Gutt, C. F. Barrett, M. L. P. M. Weatherley, P. J. Lawther, C. C. Webster, F. H. W. Green, E. G. Mallalieu, and D. Gall

INTERDEPARTMENTAL COMMITTEE ON AIR POLLUTION RESEARCH. REPORT ON PROGRESS IN RESEARCH ON AIR POLLUTION IN THE UNITED KINGDOM. *Clean Air, 1(4):11-20, Winter 1971.*

A report is presented of air pollution research in the United Kingdom. It refers to the situation as it was at the end of 1970 and it is almost entirely concerned with research partly or wholly government-funded. Main subdivisions include the abatement of emissions of pollutants, (including sulfur dioxide, oxides of nitrogen, grit and dust, industrial stack gases, smoke, motor vehicle emissions, and asbestos); the dispersion and distribution of pollutants (chimney gases, meteorological factors, global dispersion, urban area dispersion, climate factors, and atmospheric chemistry); effects on health (acute and chronic), effects on animals, vegetation, and materials (lichens and bryophytes as plant indicators, the uptake of SO2 by vegetation, the response of stomata to pollution, the growth of trees, effects of hydrocarbons on plants, uptake of SO2 by building materials, effect of air pollution on high voltage insulators, corrosion of steel, and effect of pollution on paint and pigments); and measurement methods (including particulate and gas sampling, hi-vol samplers, spectrophotometers, tape samplers, photometry, and automatic samplers).

20156 APTIC NO. 39176

Turk, Amos

PROPERTIES OF ODORANTS. *Preprint, Environmental Protection Agency Washington, D. C., 5p., 1971. 7 refs. (Presented at the Conference on the Dose-Response Rela-*

tionships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)

Odor sources can be classified according to (1) their degree of confinement, where a confined source implies a location and volumetric rate of discharge and an unconfined source may be represented by an imaginary emission point; (2) odor quality or character, i.e., definitions in terms of primary odors, degree of similarity, descriptive qualities, or complaint frequency; (3) hedonic impact scaling by preference; and (4) odor persistance or pervasiveness. All these factors characterize the odor dose in ways that significantly affect the human response at various distances from the source. The theoretical aspects of odor persistance are considered.

20157 APTIC NO. 38824

Vater, W.

POSSIBILITIES OF SEWAGE SLUDGE INCINERATION. *(Moeglichkeiten der Verbrennung von Klaerschlamm). Text in German. Mit. Ver. Grosskesselbetr., 52(1):20-25, Feb. 1972. 16 refs. (Presented at the Vereinigung der Grosskesselbetreiber-Fachtagung, Muelluerbrennung 1971, Heilbronn, West Germany, Sept. 17, 1971, Essen, West Germany, Sept. 3, 1971, and Braunschweig, West Germany, Oct. 1, 1971.)*

Sewage sludge has a high water content of generally 90 to 95%. Prior to incineration, the water must be separated. If no drying beds or waste heat is available, mechanical water separation methods must be used. For better dehydration inorganic or organic flocculants must be used. The ash content of communal sewage sludge fluctuates between 25 and 70%, depending on whether the sludge is in a fresh, decomposed, or stabilized condition. For an ash content of 50% the heating value may fluctuate between 1500 and 3000 kcal/kg/dry substance. The composition of sludge is quite homogeneous. For the combustion of such sludges rotary kilns are used most frequently. The fluidized bed furnace is also very suitable. The connection of this type of furnace to heat exchangers or waste heat boilers is economical, since the waste gases leave the furnace with a temperature of 800 to 900 C. These hot waste gases can also be used for sludge drying. The fly ash from sludge incinerators is most frequently retained in scrubbers. Either low-pressure venturi scrubbers or high-pressure spray towers are used. The scrubbing water can be recirculated. Under certain circumstances the sewage sludge can be used as scrubbing fluid. Electrostatic precipitators would be suitable too, but they are rarely used because of the high costs. With cyclones a lower cleaning efficiency is reached.

20158 APTIC NO. 39465

Vaught, J. M., W. M. Parks, S. E. J. Johnsen, and R. L. Johnson

FINAL TECHNICAL REPORT: COLLECTION AND ASSESSMENT OF AIRCRAFT EMISSIONS BASE-LINE DATA TURBOPROP ENGINES (ALLISON T56-A-15). *General Motors Corp., Indianapolis, Ind., Detroit Diesel Allison Div., Office of Air Programs Contract 68-04-0029, EDR-7200, 68p., Sept. 1971. 6 refs.*

NTIS: PB 202961

Exhaust emissions from 11 new military turboprop engines were collected and analyzed during their production-line performance evaluation. The following measurements were made: carbon monoxide, carbon dioxide, and nitric oxide, by infrared analyzers; hydrocarbons, by flame ionization detector; smoke, by SAE smokemeter; nitric oxide and nitrogen dioxide by chemiluminescent analyzer; NO plus NO2 by the modified Saltzman method; and oxygenated compounds, by the MBTH method. Concentration values measured for each engine were converted to mass emissions over a landing and takeoff (LTO) cycle representative of a commercial flight with the same turboprop engines. Emission measurements were satisfactory; the average emission levels and variations were determined over the operating range of each engine. However, the variations could not be specifically proportioned between true engine variation, instrument variability, and that incurred by measuring a production test cycle and converting to the emissions cycle. True engine variability and instrument variability should be assessed by a test that includes a larger number of engines and by a statistically planned evaluation of instrument error. Emissions during acceleration, deceleration, and starting transients were about one-twentieth of the total LTO mass emissions. Unburned hydrocarbons and CO transient emissions during engine start (measured on one engine) were nearly one-third of the hydrocarbon and CO mass emitted during the LTO cycle. Because LTO total mass emissions were highly sensitive to the length of time an aircraft was held stationary during ground operations, aircraft handling and all its variabilities should be divorced from engine emission test cycles.

20159 APTIC NO. 38868

CALCULATION OF AIR-FUEL RATIOS FROM EXHAUST GAS ANALYSES *(Calcolo del rapporto aria-combustibile dall analisi dei gas di scarico). Text in Italian. Riv. Combust. (Milan), 25(12):544-554, Dec. 1971. 4 refs.*

A method for the determination of the air/fuel ratio of internal combustion engines as derived from the analytical data of their exhausts is presented. Experiments were performed on a full capacity operating four cylinder engine under normal and misfiring conditions. The air/fuel ratio was measured by determining the air flow rate with a viscosity-type flowmeter inserted at the air inlet and by a gravimetric measurement of fuel consumption. Exhaust sampling was made with special polyvinylchloride bags applied at the exhaust pipe outlet. Hydrocarbons, carbon dioxide, and oxygen concentrations were determined by subjecting the samples to a nondispersive infrared analyzer combined with a spectrograph. Experimental diagrams were drawn to correlate the measured air/fuel ratio with the exhaust composition. The diagrams had the fuel/air ratio on the ordinate and the net percentage of carbon monoxide, CO2, CO2 for rich mixtures, O2, and total carbon computed from the analytical data of the exhaust on the abscissa. The corresponding fuel/air values were retrieved from the graphs and averaged to obtain the searched gasoline/air ratio. The procedure accounts for incomplete combustion as well as for eventual misfiring, and is applicable to a wide range of air/fuel ratios utilizing gasolines of relative density ranging from 0.7 to 0.85. In order to simplify the procedure, the diagrams were translated into equations and a FORTRAN computer program was developed utilizing HC (ppm), CO(%), CO2(%), and 02% contained in the exhaust as imput data, and the calculated air/fuel ratio as the output data. Maximum errors occurring between computed and measured air/fuel ratios reach 5%. However, the procedure produces poor results when applied to very rich mixtures or to engines operating under minimum conditions.

20160 APTIC NO. 38876

Vuorelainen, O.

SMOKE GASES AS POLLUTANTS OF THE AIR. *(Savukassut ilman likaajina). Text in Finnish. Tyoterveysuutiset, 1969:7-8, Jan. 1969.*

The worst polluters of air, besides motor vehicles, are smoky effluents from factory and incinerator stacks. The composition of these gases depends on the fuel used, the construction of the combustion apparatus, and the efficiency of smoke-cleaning apparatus. Sulfur is the most hazardous ingredient due to the corrosive qualities of its combustion products and their effects on vegetation (especially conifers) and human health. Chlorine compounds, also corrosive, are found in stack gases from solid waste incinerators because of the presence of large quantities of polyvinylchlorides in the waste. Soot and fly ash have severe nuisance effects. One way of decreasing the quantity of sulfur compounds in the air is to burn oil with a lower sulfur content. Smoky gases can also be cleaned by using one or more of four types of particle separators: dynamic separators, wet separators, filters, and electric separators. Another approach is in design of the smoke stack, which should be tall enough and properly located to take advantage of prevailing winds and terrain. Stack gas cleaning is not exceedingly difficult technically but does increase the expenses of the owner of the emission source.

20161 APTIC NO. 39030

Wada, Masahiro

FUTURE POWER DEMAND AND FUEL POLICY. *(Shorai no denryoku to nenryo taisaku). Text in Japanese. Nenryo Kyokaishi+J. Fuel Soc. Japan, (Tokyo), 51(538):61-70, Feb. 1972.*

Of Japan s total power demand reaching about 320 billion kW hr in 1970, the Kansai Electric Power Co. furnished 53 billion kW hr. This figure represents two-fold increase in the past 6 yrs and is expected to reach 85 billion kW hr in 1975 and 120 billion kW hr in 1979. Of the company s total power generation facilities of 10.77 million kW in capacity, hydraulic power accounted for 2.74 million kW (25%), thermal power for 7.69 million kW (72%), and atomic power for 0.34 million kW (3%) in 1970. The trend of more dependence on thermal power is increasing and now atomic power is increasingly used. According to the Government s atomic power development plan, Japan s atomic power generation facilities will increase to 27 million kW by 1980, 110 million kW by 1990, and 220 million kW by 2000, accounting for 50% of Japan s total electric power generation facilities. In connection with thermal power generation, problems of pollution, low-sulfur fuel oil and petroleum supplies at large were discussed. Although low-sulfur oil is naturally more desirable for the prevention of air pollution, the supply of such fuel oils is very limited. And Japan has no choice but to import crude oils from the Near and Middle East which produces high-sulfur oil. In this respect, a few representative desulfurization processes were introduced. Another problem Japan must tackle from a long-range viewpoint is how to secure enough fuel supply needed for the country s power generation. Both petroleum supplies and uranium resources were reviewed.

20162 APTIC NO. 38883

Witzky, Jullus E.

LAYER CHARGE AND AIR POLLUTION BY COMBUSTION ENGINES. *(Schichtladung und Luftverunreinigung bei Verbrennungsmotoren). Text in German. Motortech. Z. (Stuttgart), 33(4):151-155, April 1972. 1 ref.*

With the layer (stratified) charge engine, a rotary movement is imparted on the air during the intake stroke through the shape of the intake duct. During the compression stroke, fuel is injected countercurrent to the air movement. As soon as air movement and direction of injection are tuned to each other, the fuel droplets are pushed toward the center of the combustion chamber through the forces of resistance and gravity. This action brings a fuel-rich mixture into the vicinity of the ignition spark. The avoidance of a long residence time of the fuel in the combustion chamber makes the use of a wide variety of hydrocarbon fuels possible. The pollutant emission by the layer charge engine and by a normal Otto engine was measured. Both engines were driven with normal gasoline and with the same rpm and load. The exhaust gas samples were passed over a filter and a cold trap to a 50 by 75 mm balloon. For the measurement of carbon dioxide, carbon monoxide, unburned hydrocarbons, and nitric oxide, a Beckman nondispersive infrared analyzer was used. The oxygen measurements were taken with a polarographic oxygen process analyzer. The layer charge engine had a very low CO concentration (ranging from 0.157% at 1000 rpm and a load of zero kg force to 4.80% at 3000 rpm and a load of 14.5 kg force) and high O2 concentrations in the exhaust gas. For reduction of the NO emissions (which ranged from 134 ppm to 1200 ppm) a catalytic afterburner or a partial return of the waste gases is necessary.

CONTROL METHODS

20163 APTIC NO. 38746

AMERICAN S FUME BURNER CLEANS AIR. *Oil Gas J., 70(12):57-58, March 20, 1972.*

The operating characteristics of an afterburner which destroys fumes and odors from an asphalt plant are reviewed. The afterburne converts malodorous compounds in fumes from the oxidizers into carbon dioxide and water vapor. The apparatus consists of an entrance chamber, two tangentially mounted gas burners, a combustion chamber, and a stack. The unit is designed to handle maximum fume production, has a rated heat imput of 17 MMBTU/hr, a design combustion chamber temperature of 1200 F, and a minimum detention time of 0.3 sec. Afterburner operation is completely automatic.

20164 APTIC NO. 38764

BRINK MIST SEPARATOR, CLEANING OF WASTE GASES OF THE PLASTIC INDUSTRY. *(Brink-Nebelabscheider, Reinigung von Abgasen der Kunstsroff-Production.) Text in German. Plastverarbeiter, 23(3):199, March 1972.*

The waste gas from plastic producing industries contains a high percentage of smoothening agents in the form of vapors. This waste gas is cooled in an injection cooler below the dew point of the vapors. During the cooling process, part of the vapor condenses on the surface or in the cooling liquid while another part condenses into fine mist. This mist is collected in a Brink-separator consisting of a cylindrical glass fiber packet mounted between two corrosion-proof steel cages. The mist particles agglomerate in the fiber bed into a liquid stream and leave through the bottom of the filter. The clean waste gases are then blown into the air by means of a ventilator. 0

20165 APTIC NO. 38766

A LARGE PLANT FOR THE COMBUSTION OF INDUSTRIAL WASTES. *(Grossanlage fuer die Verbrennung von Industrieabfall). Text in German. Brennstoff-Waerme-Kraft, 23(11):483, Nov. 1971.*

A large combustion plant ordered by a German chemical firm will burn in rotating kilns 2300 kg/hr of solids and semisolid materials and 1000 kg/hr of liquid wastes from biological treatment installations and other sources. The 35 tons/hr of steam produced by the combustion will have captive use. An electrostatic precipitator will be used to remove dust particles from the flue gases, which will be discharged through a 112-meter stack.

20166 APTIC NO. 38890

NEW POWER-SAVING EMISSION-LOW PROCESS FOR THE PRODUCTION OF STEEL. *(Neues energiesparendes, umweltfreundliches Verfahren der Stahlerzeugung). Text in German. Technica, 19(6):449-450, March 1972.*

A new steel production process is based on two production steps, melting in the new double-pot-oven and steel refining in the earlier developed crucible furnace. During the melting process in one of the two pots, all other processes take place in the remaining pot. The melting oven is ignited with low-pressure gas. The type of process and the exhaust fan cleaning system with two venturi scrubbers helped to reduce dust emissions considerably. The electric arc furnace with a waste gas cleaning system emits 8 to 15 kg dust/ton of crude block, while the new oven emits only 0.9 kg dust/t.

20167 APTIC NO. 38896

RUSTON GAS TURBINES, TOTAL ENERGY PLANTS. *(Ruston-Gasturbinen, Totalenergie-Anlagen). Text in German. Motortech. Z. (Stuttgart), 33(4):172, April 1972.*

Ruston gas turbines produce power and supply heat by using the waste gas heat for direct or indirect drying and warm water or steam production. Three types of different sizes and capacities are available. More than 60 such gas turbines in Great Britain, Europe, and the U. S. are presently in operation. The largest such gas turbine is the total energy plant in Clydebank. It comprises four gas turbines type TD 4000 each with 3.6 MW. The waste gases are passed through two waste heat boilers for the production of a total of 45 tons of steam/h. Another total energy system with eight gas turbines (type TA 1500 each with 1.1 MW) is in Nottingham. The waste gas is passed through a waste heat boiler which produces 8 tons of steam/hr.

20168 APTIC NO. 38897

M.A.N. DIESEL ENGINES. *(M.A.N. Dieselmotoren). Text in German. Motortech. Z. (Stuttgart), 33(4):166-167, April 1972.*

The M.A.N. company in Nuremberg displayed at the Hannover fair three diesel engines of the new series D25 and four engines of the current production. The familiar M-combustion process is applied in improved form to all engines of the series D25. Through a step in the spherical wall of the piston combustion chamber and a tuned fuel injection, it was feasible to reduce the aldehydes concentration in the waste gas considerably. Moreover, the blue smoke after starting has been eliminated entirely. The eye irritation effect and odor annoyance has been markedly weakened.

20169 APTIC NO. 38902

AIR FILTERS. *(Kuki seijo sochi). Text in Japanese. Fuji Jiho (Fuji Elec. J.), 45(1):142-145, Jan. 1972.*

Several types of air cleaning equipment are discussed. Electric air filters, a dry type electric air cleaner, and an automatic winding-type roll filter feature the highly stable operation and maintenance-free performance. They are mostly used in multistory buildings, banks, hospitals, and computer centers. With enforcement of the new Building Sanitation Control Law effective Oct. 1970, more than 200 of them were delivered last year. Specifications of the LUFT electrostatic filter are given. It has a 95% dust, odor, and sulfur dioxide removal efficiency. The clean booth or a mobile clean room are now popularly used in food-processing, brewing, dairy products manufacturing, and chemical and pharmaceutical firms. The clean bench is widely used in firms manufacturing semiconductors and precision machines.

20170 APTIC NO. 38910

NEW INKS CURE PRINTERS AIR POLLUTION PROBLEMS. *Chem. Week, 110(10):44, March 8, 1972.*

Most lithographic and letterpress inks contain about 30% solvent; some -- for example, those for gravure printing -- contain as much as 80%. It is these solvents, primarily ketones and esters, driven off at about 300 F in the drying process that share the blame for Low Angeles photochemical smog. Both Los Angeles Rule 66 and Philadelphia s new law call for an 85% reduction in content of certain solvents, including those used in printing inks. The long-range answer appears to be the rapid drying of solventless inks by polymerization under ultraviolet light. Ultraviolet lamps, operating at 2400-3600 angstroms, activate monomers in the special inks. The resulting polymerization fixes the ink on the paper almost instantaneously. Advantages and disadvantages of this method are indicated. In addition to the higher cost, printers must vent the small amount of ozone produced in the process. Baffling is required because of the intense light energy produced.

20171 APTIC NO. 39061

FILTER BAGS FOR DUST COLLECTION FROM WASTE GASES. *(Filterschlaeuche zur Entstaubung der Abgase). Text in German. Wasser Luft Betrieb, 16(4):130, April 1972.*

Filter bags made of the aromatic polyamide fiber Nomex have been used for the first time for dust collection in the lime industry. The waste gases which develop at the production of calcium oxide are relatively neutral. An average life-time of the filter bags of 1-2 yr can be expected. Each of four filtering systems installed in a lime production plant comprises 14 chambers with 252 bags or 518 sq m filtering area. With the new bags the dust concentration could be reduced to 50 mg/cu m. With the aging of the bags, the dust concentration in the cleaned gas will rise to 70 mg/cu m. The total gas volume per filtering system amounts to 33,000 cu m/hr. The length of the bags is 3300 mm, the diameter 200 mm. The filters are tolerant of temperatures to 220 C. Peak temperatures of 260 C for short periods of time are feasible. For cleaning of the bags a combination of periodic vibration with reverse air jet is used.

20172 APTIC NO. 39104

CLEANUP PAYS OFF FERTILIZER PLANT. *Environ. Sci. Technol., 6(5):400-401, May 1972.*

Farmland Industries of Bartow, Florida, spent nearly a million dollars a couple of years ago to install a fluorine recovery system in its 22 million dollar phosphate fertilizer plant. During the first full year of the system s operation, Farmland recovered more than 5000 tons of fluosilicic acid--a by-product it had previously been wasting--and sold every ounce of it. The fluorine recovery equipment is not complicated and works well. The tops of the evaporators were simply unbolted at a flange and a water recirculation system was installed in the exit gas stream. As the phosphoric acid is successively concentrated in the evaporator units, fluorine-containing off-gases are concentrated in an aqueous solution. With the recirculation system, a fluosilicic acid concentration of about 20% is obtained.

20173 APTIC NO. 39356

Voorhees (Alan M.) and Associates, Inc., McLean, Va. and Ryckman, Edgerley, Tomlinson and Associates, St. Louis, Mo.

A GUIDE FOR REDUCING AUTOMOTIVE AIR POLLUTION. *Office of Air Programs Contract CPA 70-100, 77p., Nov. 1971. 56 refs.*

NTIS: PB 204870

This Guide is designed to aid transportation professionals and state air pollution control agencies in selecting transportation controls suggested in the regulations promulgated pursuant to the Clean Air Act of 1970. Actions considered here emphasize the reduction of traffic volume and congestion, and can be implemented within five years. Techniques for improving traffic flow include reverse lane operations, driver advisory displays, ramp control, and interchange design on freeways. Alignment, widening intersections, parking restrictions, signal progression, reversible lanes, reversible one-way streets, and helicopter reports are considered for improving traffic flow on arterials. The downtown distribution of traffic flow may be aided by traffic responsive control, one-way street operations, loading regulations, pedestrian control, and a traffic operations program to increase capacity and safety. Techniques for reducing pollution concentrations include staggered work hours, roadway concentrations, cross-sections, and elevated, at-grade, depressed roadways. Techniques for reducing auto traffic include bus lanes, park-ride operations, parking bans, gasoline rationing, four-day forty-hour week, road user tax, and car pool incentives. Types of pollutants and their sources are considered, as well as variations in pollution concentrations according to location and time of day. Effects of urban heat islands, building configurations, and roughness effects on dispersion are mentioned.

20174 APTIC NO. 39632

National Aeronautics and Space Administration, Washington, D. C. and Atomic Energy Commission, Washington, D. C.

AUTOMATIC FILTER-BLOWBACK SYSTEMS USED WITH SINTERED-METAL FILTERS. *37p., 1968 (?). 31 refs.*

Sintered-metal filters have been used in a wide variety of pilot plant and laboratory fluid-bed reactors to remove entrained particulate solids from the fluid-bed effluent gas stream. Periodic fractional second pulses of approximately 100 psig gas directed from a nozzle venturi assembly in a reverse direction to the normal gas flow path have been successful in removing accumulated power from sintered-metal filters. A major advantage of pulse blowback is that it reduces the problem of filter plugging encountered in continuous reverse flow blowback systems. With continuous flow, portions of the filter appear to be cleaned too thoroughly; pores are opened that become plugged during subsequent filter use. With pulse blowback, a dust layer remains, which, acting as a prefilter, does the filtering in place of the sintered metal. For a wide variety of laboratory and pilot plant units, successful operation was achieved with a ratio of blowback pulse volume to single filter volume of 0.5-8.0 and a ratio of blowback gas flow rate to forward flow rate ranging from 1.3 to 10.0. Suggestions are made for future studies. (Author conclusions modified)

20175 APTIC NO. 39634

POLLUTION CONTROL AT A COPPER SMELTER. NORDDEUTSCHE AFFINERIE BUILDING THE LARGEST SMELTER ACID PLANT IN EUROPE. *Sulphur, no. 95:45-46, Aug. 1971.*

Apart from the oxide ores, which are less important as sources of copper, the output from most copper mining operations is in the form of the sulfide minerals: chalcopyrite, chalcocite, and bornite. Most concentrates supplied to the copper smelters also contain some pyrite. The conventional pyrometallurgical process for producing copper involves two stages. First, the concentrates are smelted in a reverberatory furnace to copper matte, which is a mixture of iron (II) sulfide and copper (I) sulfide. In the second stage of the process, copper matte from the reverberatory is treated in a converter for the production of blister copper, which may be refined further, either by heat treatment or by electrolytic reduction. A German firm roasts the concentrates to remove some of the sulfur content prior to the reverberatory smelting stage. Now under construction, the new facilities of the firm will incorporate a flash-smelting furnace, in which the roasting and smelting processes are effectively combined into one operation. Another advantage of the flash-smelting furnace is that its closed design enables all the furnace gas to be channelled to the sulfuric acid plant. The sulfuric acid plant operates on the Bayer double-catalysis process.

20176 APTIC NO. 39643

AIR POLLUTION: A PUBLIC RELATIONS PROBLEM FOR ALL URBAN OIL REFINERS. *World Petrol., 1952:78-83, July 15, 1952.*

The oil refiner in an urban community is sensitive to the attitude of the public because of the effect on gallonage which may result if customers think that the plant is responsible for smog. The control program of a major oil refiner in the Cleveland area is described. A great deal of study has gone into the flare problem in an effort to reduce the quantity of flare gas and to provide proper burning devices. A primary method of reducing volume is to provide greater compressor capacity for the vapor recovery plant. An improved flare tip design was developed. Odor was traced to three principal sources: acid treating of lubricants which involved sulfur dioxide ans sulfur trioxide, grease manufacture involving fatty acids with unpleasant odors and certain processes evolving hydrogen sulfide, and asphalt manufacture evolving hydrocarbon aerosols. A conventional water spray tower was successful in removing acid treating fumes. Fog filters can be used to absorb fatty acid odors, a catalytic device for improving combustion which will reduce smog is also being developed.

20177 APTIC NO. 39647

ODOR-POLLUTION CONTROL. *Mech. Eng., 75(10):815-816, Oct. 1952.*

Odor pollution control with a new catalyst, the Oxycat is discussed. The basic Oxycat is a cagelike unit made up of two thick porcelain end-plates between which are a porclain spacer bar and 73 coated porcelain rods. The Oxycats are stacked in the required number side by side and one on top of the other in the exhaust stacks of furnaces, ovens, incinerators, or power plants. The tear-drop drop design of the rods minimizes resistance of air flow and exposes a maximum catalyst surface to the moving air stream. Waste gases flow across the rods. Combustion of the gases occurs at the surface of the rods which are coated with a 0.0003-in. film of catalytic agent: catalytic alumina and platimum alloy. Noxious fumes and waste gases can be burned at temperatures far below their normal ignition points.

20178 APTIC NO. 39707

EXHAUST SYSTEM HANDLES SULPHURIC ACID FUMES. *Iron Steel Engr., 37(10):185-186, Oct. 1961.*

Safe, efficient, economical, and maintenance-free removal of fumes from sulfuric acid pickling operations can be achieved by removing the fumes through duct systems built of plastic materials. A case history is cited in which Heil Process Equipment Corporation ' Rigidon plastic duct (glass reinforced polyester) was selected. The material is lightweight, fire retardant and self-extinguishing, and possesses sufficient strength to withstand normal mechanical abuse. A 112,000 cfm fume scrubber to remove the sulfuric acid fumes was also installed at the particular midwestern steel mill which is cited.

20179 APTIC NO. 39708

HOW TO COPE WITH AIR POLLUTION. *Chem. Eng., 66(16):113-124, Aug. 10, 1959. 5 refs.*

Stardust Chemical Co., an imaginary plant employing some 2300 people and situated on a tidal estuary, has two divisions: the refining division which has a crude charge capacity of 40,000 bbl/day and a catalytic cracking capacity of 15,000 bbl/day and the chemical division which uses refinery by-product gases and piped-in natural gas to make organic chemicals. Four other process plants are nearby and within polluting distance of the town of Westfield. Air pollution due to the Stardust plant was considered in a panel discussion at the Industrial Section of Texas Water and Sewage Works Association s Short School which is held annually in March at Texas Agricultural and Mechanical College. Company technical staff indicate in the discussion the way in which sulfur dioxide, hydrogen sulfide, and hydrocarbon problems can originate, as well as the company s plans to control its pollution problems with the Calus sulfur recovery method. Costs, health, and legal aspects are mentioned.

20180 APTIC NO. 39747

American Foundrymen s Society, Des Plaines, Ill., Air Pollution Control Committee

CONTROL OF EMISSIONS FROM METAL-MELTING OPERATIONS. *26p., 1954. 47 refs.*

The reduction of air pollution through control of emissions from metal melting operations is discussed. The types of metal melting equipment which produce the most obvious sources of air pollution are the cupola, open-hearth furnace, electric-arc furnace, and the air or reverberatory furnace. In non-ferrous melting the extent of pollution generated depends upon the type of metal being melted. Effective control of emissions from melting furnaces is complicated by a number of factors such as: the great number of ultrafine fume particles in stack gases; high temperatures of furnace stack gases; the large volume of gases; use of water spray equipment for stack gas cooling which frequently presents corrosion problems; and the added operating cost burden of air pollution control equipment. Dust particle size and the nature of solids in furnace stack gases are considered. Pollution codes and control ordinances are discussed for different states. Visible emissions are mentioned. Metallurgical stack emissions and cupola stack

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emissions are indicated, including cupola operational improvements. Stack burners and secondary combustion equipment, medium and high-efficiency dust collectors, and cupola dust collector details are described. The screen-cage type of cupola cinder collector, simple spray washers, an improved cupola gas washer with cone, dry mechanical or centrifugal collectors, and high-efficiency wet collectors are included. Bag cleaning methods, filter materials for elevated temperatures, and collector installations are indicated for cloth dust collectors. Methods of preheating combustion air for the cupola are cited. Electrostatic precipitation is described. Control methods are also described for the other furnaces, as well as atmospheric sampling and analysis. Area sampling, stack or duct sampling, and particle size determinations are mentioned.

20181 APTIC NO. 39758

TWO SO2-REMOVAL PROCESSES. *Oil Gas J., 70(17):86-87, April 24, 1972.*

Two processes to remove sulfur dioxide from flue gas are slated for pilot-scale testing. Atomic International s process uses a spray mist of carbonate salts in water to remove sulfur oxides from combustion gases. Research-Cottrell s particulate/SO2 absorption system has been ordered by Arizona Public Service Co. for its 115-mw Cholla generating station. The system used wet limestone absorption and a rigid absorption packing. In the molten carbonate process, a spray mist of carbonate salts in water contacts the stack gases. The hot gas evaporates the water leaving a dry powder. Sulfur oxides in the stack gas react with the carbonates to form sulfite and sulfate. The salt mixture is circulated to the regenerator where the sulfites and sulfates are reduced to sulfide. Sulfides are regenerated to carbonate for recyling. Hydrogen sulfide which is released during regeneration can be converted to elemental sulfur or sulfuric acid. The wet absorption system to be used at Arizona Public Service Co. will be added to the plant s multitube mechanical dust collectors. The system will include scrubbers, absorption towers, and auxiliaries.

20182 APTIC NO. 38747

Aikawa, Michinosuke, Mareo Sato, Kenji Hagimori, and Shuntaro Ono

MANUFACTURING METHOD FOR DESULFURIZATION PELLETS FOR ABSORPTION OF HYDROGEN SULFIDE. *(Ryuka suiso kyushuyo datsuryu peretto no seizo hoho). Text in Japanese. (Toho Zinc Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 46-34401. 4p., Oct. 8, 1971. (Appl. July 4, 1968, 1 claim).*

A solution of zinc sulfate is treated by sodium carbonate to form basic zinc carbonate. The product is then heated to 300 C and powdered. Ten to 15 wt% of alumina cement is added and formed into pellets. The pellets are roasted at 300 to 400 C. The spongy consistency of the porous product gives it a greater surface area than ordinary zinc carbonate pellets; therefore the absorption of hydrogen sulfide is far greater.

20183 APTIC NO. 39648

Anderson, Eugene F.

THERE ARE INDIRECT BENEFITS FROM A FURNACE FUME COLLECTOR. *Foundry, 83(9):152-153, Sept. 1955.*

A fume control system on an electric arc steel-melting foundry furnace is described. A hood was made to cover the entire roof of the furnace through which air passed at high velocity. This counteracts the ambient air currents in the melting room that tend to disperse the dust and fume, and traps the particles before they escape. Ducts carry particle-laden air to the collector, which filters it through thousands of square feet of Orlon cloth in the form of tubes. The dust and fume particles are trapped in the tubes, and the air is then sufficiently clean that it can be discharged to the atmosphere with no visible matter in it. A stub was left in the duct work to facilitate connecting a second furnace to it in the future. Furnace roofs now last 20% longer. The collector provides filtration efficiencies ranging to 99% and higher, even with the smallest dust and fume particles.

20184 APTIC NO. 39430

Aplan, F. F. and Alfred J. Engel

SULFUR OXIDES AND POWER GENERATION. *Technol. Tutor, vol. 2:67-73, Jan. 1971. 12 refs.*

Over 80% of the 26 million tons of sulfur oxide pollutants emitted annually in the U. S. are produced by electrical power utilities and by industry. Since there is no reasonable alternative in the immediate future to the consumption of large quantities of fossil fuels, the associated emissions must be controlled. In considering modifications for power plants, the primary problems are the enormous throughputs of fuel, air and combustion products and the difficulties associated with treating the enormous quantities of stack gases to be cleaned. Two-thirds of the coal mined in the United States is cleaned, mainly by specific gravity methods, including heavy media, heavy media hydrocyclones, compound water cyclones, jigs and shaking tables. The flotation process in increasingly important. The Reinluft, alkalized alumina, catalytic oxidation, and dolomite injection processes for sulfur dioxide control are reviewed.

20185 APTIC NO. 39715

Ardern, D. B. and Raymond C. Lassiat

NEW DEVELOPMENTS IN THE DISPOSAL OF REFINERY WASTE GASES. *Proc. Am. Petrol. Inst., Sect. III, vol. 34:201-206, 1954. (Presented At the American Petroleum Institute Division of Refining, Mid-year Meeting, 19th, Houston, Tex., May 12, 1954.)*

A newly developed combustion catalyst, Oxycat, is being used in the petroleum industry to burn carbon monoxide contained in the catalytic cracking unit flue gases. Oxycat consists of a platinum alumina alloy coated on porcelain rods which are mounted in bricklike elements installed in a bed through which the waste gases pass. Besides the fuel savings achieved, Oxycat elements are effective in air pollution control. Traces of high-boiling vapors in a moving-bed cracking unit flue gas stream are burned with CO to produce a completely clear stack effluent containing only a trace quantity of carbon monoxide. In another innovation, when the heat demand exceeds the potential waste heat available in the flue gases, direct injection of flue gas in fired boilers in a practical method for steam production. Layout, process features, costs, and operating data are given for Oxycat installations.

20186 APTIC NO. 38797

Austin, James and John David Ellis

PROCEDURE AND EQUIPMENT FOR THE TREATMENT OF WASTE GASES DEVELOPED DURING THE CONTINUOUS PHOSPHORIC ACID CONCENTRATION PROCEDURE OF THE WET PROCESS. *(Verfahren und Vorrichtung zur Abgasbehandlung bei der kontinuierlichen Phosphorsaeurekonzentration in der Tauchbrenner-Verdampfungsanlage). Text in German. (Occidental Research and Engineering Ltd., London (England)) W. Ger. Pat. Appl. 1,567,731. 9p., July 21, 1965. 7 refs. (10 claims).*

The procedure and equipment for treating waste gases emitted during the concentration stage of the chemical processing of phosphoric acid when the phosphoric anhydride concentration is increased to at least 68% by weight are examined. The waste gases pass through a throttle into a wash zone at 4.5-30 and 30-120 m/sec to give a pressure drop of at least 38 cm of water. Before entering the throttle, the gas is sprayed with hot phosphoric acid with up to 50% P205 by weight. The largest droplets are broken up at the throttle. The acid is separated and the gas is washed with cold water in the final step. The process recovers by-products from the waste gases.

20187 APTIC NO. 38860

Bauer, Hans-Dieter

A DUST COLLECTION SYSTEM AT THE POINT OF LOADING THE MINED PRODUCT ON THE CONVEYOR SYSTEM. *(Eine Entstaubungsanlage fuer die Uebergabe vom Streb-zum Streckenfoerdermittel). Text in German. Glueckauf (Essen), 108(6):204-209, March 1972. 6 refs.*

The mined product which falls into the shaft cart is loaded into wagons or a conveyor system for transporation out of the mine. At the point of transfer, a dust fan was installed for drawing off the developing dust. As a dust collector, cloth filters were too space-consuming. They would have required an area of 225 sq m for the dust quantity of 450 cu m/min which is to be treated. The wet mechanical separator called Rotovent had the smallest dimensions. A detailed description of this wet collector is given elsewhere. Only the most influential parameters for dust collection are discussed. They are the velocity in the mixing path, the quality of water entered, the dust load of the unclean air flow, and the droplet spectrum of the atomized water. A water quantity of 0.3 l/cu m drawn-on air is required. In oder to avoid any interference with the mining process, the exhaust hood was open on the side facing the shaft. A large quantity of scrubbing water was recirculated.

20188 APTIC NO. 39751

Belin, F. T., Ya. M. Bergart, N. N. Nikolaev, S. Ya. Shapiro, and O. I. Eliseev

A BOILER FOR HYDROGEN SULPHIDE COMBUSTION. *Coke Chem. (USSR) (English translation from Russian of: Koks i Khim.), no. 6:52-55, 1971.*

An improved design for a boiler for the combustion of hydrogen sulfide was adapted for use in the sulfur removal plant of a coke and chemical works. The boiler is of the through-flow separator type connected to an afterburning chamber. Its basic merits include intense heat transfer in the firebox, gas exit temperatures that can be regulated against changes in load, highly efficienct mixture formation in the burner unit, minimum formation of nitrogen and sulfur trioxide, resistance to corrosion, and simple design. The combustion products are cooled to 700-750 C in the boiler before going for conversion to sulfuric acid by the wet catalytic process.

20189 APTIC NO. 38823

Bender, Rene J.

AIR POLLUTION CONTROL: ITS IMPACT ON THE METAL INDUSTRIES. *Power, 116(4):56-60, April 1972. 1 ref.*

While the control of air pollution can be accomplished readily in a reasonable period of time by the larger steel, aluminum, and nickel producers, and with a little greater effort by the largest copper and copper-derivative companies, it can have disastrous consequences upon small, low-capital enterprises. One of the most difficult problems in the steel industry is to eliminate emissions while loading and unloading coke ovens. The basic oxygen process, bag houses, and other steps being taken by the steel companies to modernize their equipment to maintain a clean environment are mentioned. Tall chimneys and electrostatic precipitators are being utilized by the nickel industry, while a new molten aluminum fluxing process and a chemically coated filter-bag system are under development for the aluminum industry. The effect of strict emission regulations on the copper industry and the plight of small foundries are mentioned. Costs for pollution cleanup are given.

20190 APTIC NO. 38858

Bendixson, Terence

THE GREAT CLEANING ACTION. *(Die grosse Saeuberungsaktion). Text in German. Gesundheitstech., vol. 1:14-15, Jan. 1972.*

Due to the new air pollution standards given by the U. S. Authorities for cars produced from the year 1975 on, efforts have been made by the British automobile industry to find suitable solutions to control the exhaust gas concentration of cars. One possibility is the application of thermal reactors added to exhaust gas tubes where the exhaust gas temperature is 800 C, they provide. For the combustion of hydrocarbon and carbon monoxide when adding air. Other tests have been performed with two additional exhaust gas heads acting as catalytic transformers which reduce nitrogen oxides, hydrocarbons, and carbon monoxide. The new Jaguar Motor mounted into the sport cars of this type is equipped with an air injection system based on special carburetors and valves which aspirate more air during breaking thus having the same effect as the thermal reactor, namely the oxidation of unburnly hydrocarbons and carbon monoxide. Also, Germany and France will introduce tolerances for air pollution in the course of this year. Special test stands have been developed for measuring the concentration of the exhaust gases.

20191 APTIC NO. 39297

Bergen John von

THE COUNTERACTION OF INDUSTRIAL ODORS. *Air Repair, 3(2):64-67, Nov. 1953.*

Aspects of odor perception and several control methods are discussed. Many of the chemical deodorants devised are irritants, and in some cases such as ozone, with its by-products, are extremely toxic. Combustion is not an effective method of odor control unless it is complete. In odor counteraction, certain pairs of odors in appropriative relative concentrations are antagonistic and when the two are sniffed together, the intensity of each is dimished. This is distinguished from odor masking, in which a stronger odor masks a weaker one. An odor counteractant is atomized into the airstream of odorous exhausts by a calibrated atomizing nozzle. The counteractant vaporizes and is combined with the airstream by molecular dispersion.

20192 APTIC NO. 39498

Bernstein, R. H.

THE BASIC CHEMISTRY OF FLUE GAS DESULFURIZATION. *Technical Assoc. of the Pulp and Paper Industry, New York, Tappi Eng. Conf., 25th, Proc., Denver, Colo., 1970, p. 85-95. 14 refs. (Oct. 27, Paper 4-1.)*

The basic chemical equations representing the several mechanisms by which sulfur dioxide can be removed from power plant flue gases are reviewed. The goal of desulfurization has attracted a multitude of process schemes which in turn represent such diverse fundamentals as catalysis, adsorption, chemical reaction, solubility in water, or a combination of these. One system involves removing fly ash and catalytically oxidizing SO2 in the flue gas to sulfur trioxide. The SO3 reacts with water vapor in the flue gas and is condensed as sulfuric acid at an average concentration of 80%. Dry dolomite injection/wet scrubbing, magnesium oxide scrubbing, absorption in potassium sulfite solution, the reaction of sodium hydroxide with SO2, dry limestone, and black liquor scrubbing are described. The problem of desulfurizing flue gases is compared with utilizing or recovering the SO2 present in gas streams of pulping processes. (Author bstract modified) 0

20193 APTIC NO. 39646

Beychok, Milton R.

BUILD A FLARE FOR UNDER $5,000. *Petrol. Process., 8(8):1162- 1163, Aug. 1953. 1 ref.*

A flare installed at a California oil refinery to eliminate smog by smokeless burning of hydrocarbons is described. The flare is located about 300 ft due north of the closed refinery unit. The refinery flare header discharges to a vertical liquid trap, where liquid carry-overs are caught and drained to the sump.

Dry gas then discharges to burner lines, which open on a preset pressure schedule. If pressure valves do not open, a clear line by-passes the valves and discharges to the largest burner bank. Burners are lighted by constantly burning pilot flames and are enclosed on four sides by a concrete, steel-reinforced wall. This is enclosed by an earthen retainer. Control valves and units are far enough from the combustion zone to allow safe operation and maintenance. Design capacity is 2 million scfd.

20194 APTIC NO. 39291

Blue, Jerry D. and William F. Llewellyn

HALSEY RECOVERY SYSTEM REPORT. FIRST YEAR OPERATION FOR ODOR CONTROL. *Technical Assoc. of the Pulp and Paper Industry, New York, Tappi Eng. Conf., 25th, Proc., Denver, Colo., 1970, p. 395- 405. 3 refs. (Oct. 28, Paper 10-3.)*

First-year operating experience with a kraft pulp and paper mill odor control recovery system is described, and equipment and system concepts and designs are reviewed. Performance data show that a recovery boiler design eliminating direct contact evaporation and arranged to fire un-oxidized black liquor supplied directly from the multiple effect evaporator can meet or exceed predicted performance and odor reduction requirements. Electrostatic precipitators and incineration are also indicated. Minor problems associated with the new system are discussed. (Author abstract modified)

20195 APTIC NO. 39730

Bowen, William M.

OXIDIZING CATALYST... A SOLUTION TO AIR POLLUTION PROBLEMS. *Ind. Power, 66(4):51-54, April 1954.*

The oxidizing catalyst can remove odors and visible smoke from stacks exhausting unburned materials, including carbon monoxide gases; generate usable heat in the process; turn waste gases into usable power; and indirectly improve production processes and products and increase safety by reducing fire hazards. To burn wax smoke at temperatures well below the normal ignition point in a powdered metals plant, a bed of 204 Oxycats were installed above the wax burn-off oven. Each unit is a cage-like structure of 73 porcelain rods held together by two square porcelain end plates and a porcelain spacer bar. The surfaces of the rods are coated with the catalytic agent (alumina and platiumum alloy for this application). The Oxycats are stacked side-by-side and one on top of the other in the exhaust stack of the oven. The waste gases flow across the rods. At the coated surfaces of these rods a catalytic reaction takes place, oxidizing the exhaust to a harmless effluent of carbon dioxide and water vapor, invisible to the eye. Other applications include odor removal, incinerator smoke control, and truck exhaust control. The Oxycat will function over a wide range of inlet temperatures and concentrations. Under most stack conditions the catalyst should last for many years.

20196 APTIC NO. 39744

Bradley, Linn

PRACTICAL APPLICATIONS OF ELECTRICAL PRECIPITATION AND PROGRESS OF THE RESEARCH CORPORATION. *Trans. Amer. Inst. Elec. Eng., vol. 34:421-464, 1915. 26 refs. (Presented at the American Institute of Electrical Engineers, Midwinter Convention, 3rd, New York, N. Y., Feb. 19, 1915.)*

In connection with the development and administration of processes for removing from gases finely divided particles suspended therein, the Research Corporation has not only devoted considerable time and effort to a consideration of the theories, but also has endeavored to adapt them successfully to a great variety of practical conditions, and to further strengthen and standardize the art. The technical and financial progress made by the Research Corporation since its organization in 1912 is given, and several plants utilizing electrostatic precipitation are described. Voltages, electrode spacings, power consumption, and other details are given. Mention is made of a number of improvements in the electrical apparatus and means for its control. Photographs of installations in various stages of operation are reproduced. Curves and charts show the peculiar character of the circuit, including the method of obtaining data to be used in designing precipitators and of conducting tests. Alternating current of 250,000 volts has been rectified and used for precipitating particles from gases. Fumes have been separated into fractions by means of temperature control and the electric processes. (Author abstract modified)

20197 APTIC NO. 39305

Bretscher, H.

MEASURES FOR PREVENTION OF EMISSIONS FROM ORGANIC CHEMICAL INDUSTRIES. *(Massnahmen zur Verhinderung der Emissionen in der organisch-chemischen Industrie). Text in German. Eidgenoessische Kommission fuer Lufthygiene, Zurich (Switzerland), Probleme der Luftverunreinigung durch die Industrie, p. 7-14, 1968. (Sept. 9-10.) (Presented at the Schweizerisches Treffen fuer Chemie, 2nd, Basel, Switzerland.)*

Conditions at the Geigy Chemical Works are discussed. The temperature of the waste gases only slightly above the temperature of the outside atmosphere, and therefore reliance on high chimneys only would be impractical. The general ventilation system transports waste gases which are composed predominantly of air with small concentrations of dust and gaseous substances. Concentrated reaction gases are collected at the reaction vessels and conducted into washing installations for absorption by suitable washing fluids. Odorous waste gases are purified in a separate installation where the smell is removed by chemical absorption, combustion, or ionic exchange in the gaseous phase. The ionic exchange is usually based on an exchange adsorption using a matrix of synthetic resin. Venturi washing installations are employed for removal of dust and aerosols.

20198 APTIC NO. 39286

Brewer, G. L.

ODOR CONTROL FOR KETTLE COOKING. *J. Pollution Control Assoc., 13(4):167-169, April 1963. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 55th, Chicago, Ill., May 20-24, 1962.)*

Nearly all kettle operations, including the manufacture of paints, varnishes, chemicals, and asphalt, involve a fume and odor problem. The release of the hazardous combustible fumes and objectionable odors to the atmosphere results in widespread neighborhood complaints and damage to property and vegetation. The most successful method of eliminating these problems is catalytic combustion, i.e., oxidation of combustible kettle gases in the presence of a platinum catalyst. The catalyst enhances the oxidation reaction in two ways: it lowers the temperatures required for sustaining combustion and decreases the dwell time. Products of the reaction are carbon dioxide, water vapor, and heat. Because of the high efficiency of catalysis (99.5%), essentially all combustibles are converted to inerts. Operating and maintenance costs of catalytic systems are substantially lower than for thermal combustion systems. In addition, the catalytic systems do not require disposal of contaminated water or sludge, since fumes are kept in a gaseous state throughout the process.

20199 APTIC NO. 39106

Brokaw, Richard S. and David A. Bittker

COMPUTATION SHOWS EXHAUST REACTOR SHOULD RUN ABOVE 1400 F WITH AIR. *Automotive Eng., 80(4):40-41, April 1972. 2 refs.*

Effectiveness of an exhaust gas thermal reactor in reducing pollutants depends upon how well the gas is mixed and how fast the compounds react. To examine the effect of reaction rate, perfect mixing was assumed and reaction rates were calculated for carbon monoxide in gas mixtures resembling gasoline engine exhaust. The work involved numerical integration of a set of first order, nonlinear differential equations for a system of 29 reversible chemical reactions. Above 1400 F, CO oxidizes completely in times which are short compared with the residence time in the reactor. The suggestion is that mixing limits efficiency at these temperatures. Nitric oxide catalyzes the reaction at lower temperatures. Conditions that promote CO oxidation probably promote hydrocarbon oxidation. Final cleanup is faster in the presence of excess air.

20200 APTIC NO. 38862

Budinsky, Karel

THE MOVEMENT OF SOLID PARTICLES IN THE ROTATING FLOW DUST SEPARATOR. *(Die Bewegung der festen Teilchen im Drehstroemungsentstauber). Text in German. Staub, Reinhaltung Luft, 32(3):87-91, March 1972. 9 refs.*

The rotating flow dust separator is a mechanical dust collector which operates according to the principle of particle separation by centrifugal force. The dust-laden gas flow enters the separator at the bottom center. Guide vanes at the entrance impart a rotary movement to the gas flow. Secondary air (either clean or ambient air) enters tangentially at the top. The rotating flow dust separator has higher collection efficiency and lower wear than the cyclone but a higher power consumption. Exact measurements of the velocity field of the rotating flow dust separator were carried out with a separator of 300 mm diameter and a length of 100 mm. The results were used for calculation of paths of particles of various grain size in the collection chamber. The equation of motion was derived and solved numerically, because an analytical solution is not possible. The measured dust collection efficiency was around 75%, the calculated around 70%.

20201 APTIC NO. 39379

Burger, H. and F. Lang

AN ALMOST EMISSION-FREE CUPOLA FURNACE DEVELOPED AT THE GEORG FISCHER GMBH IN METTMANN/RHEINLAND. *(Ein nahezu emissionsfreier Kupolofen - fortschrittliche Entwicklung bei Georg Fischer GmbH in Mettmann/Rhld.). Text in German. Luftverunreinigung, 1971: 28-30, Dec. 1971.*

A dry electrostatic dust separator for cupola furnace gas containing 40% quartz, 18.2% fire loss, 17.75% copper oxide, and 2.2% of calcium oxide ranging in grain size from 0-500 micron is described. The furnace gas from the throat is led into a preliminary separator and then to a conditioning tower, where water is added and the gas is partly burned to increase the temperature. The gas is then admitted to a dry electrostatic filter by means of a blower, while the pressure in the filter is controlled by an exhaust fan. As the cleaned gas is burned in a special chamber, cleaned and burned gas constitute the only emissions conveyed into the atmosphere. The cupola furnace always operates with the filter switched on. The smoke after filtration is invisible. The dust emission, measured in two cases, was 0.042 and 0.056 kg/t of molten iron, respectively. The above system is generally suitable for furnace shafts above 1 sq m.

20202 APTIC NO. 39222

Burns, W. E. and R. R. McMullan

NO NOXIOUS AMMONIA ODORS HERE. *Oil Gas J., 55(8):129-131, Feb. 25, 1957. (Presented at the Air Pollution Control Association, Houston, Tex.)*

Air pollution control at an ammonia plant designed to produce 450 tons per day of anhydrous ammonia from air and natural gas is described. In this process there are two potential sources of air pollution: the offgas from the regenerator that removes the carbon monoxide from the copper liquor; and the purge gas from the converters in the synthesis section of the plant and the vapors from the ammonia storage tanks and spheres. Offgas from the regenerator is disposed of by piping the gas to the boiler furnaces, where it is burned as supplementary fuel. However, the ammonia must be removed from the gas prior to burning since corrosive nitrogen oxides would be formed from the combustion of the ammonia. Two water washers absorb essentially all of the ammonia. To prevent the buildup of methane and argon in the synthesis cycles, it is necessary to vent about 100-200 std cu ft/min of the synthesis cycle gas from the system. Recovery of the ammonia by absorbers is indicated.

20203 APTIC NO. 39150

Buxmann, Joachim

AIR COOLING FOR CONDENSATION STEAM POWER PLANTS. *(Luftkuehlung fuer Kondensationsdampfkraftwerke). Text in German. Tech. Ueberwach. (Duesseldorf), 13(4):121-126, April 1972. 18 refs.*

Control of thermal pollution from steam power plants is examined. At the production of electric energy in thermal fossil-fueled or nuclear power plants, about 50-65% of the fuel heat must be discharged either into the water or the air in form of condensation heat. Three cooling methods are available, i.e., fresh water cooling, evaporation cooling, and air cooling. The first two methods require considerable quantities of cooling water. The third method affects the temperature of the ambient air. With the direct air cooling method, the waste steam from the turbine is passed to the cooling elements where it condenses. The direct air cooling system can be used for power plants up to 200 MW only. For larger plants, the indirect air cooling system, where the waste heat warms up circulating water by 10-15 C, is best. In the cooling elements of the cooling tower, the heat of the circulating water is passed on to the air. The two air cooling methods will be used increasingly by power plants since the enormous water quantities required for fresh water cooling are not greatly available. For a 1000 MW fossil-fuel-fired power plant 35 cu m/sec of fresh water are required; for a nuclear plant, 50 cu m/sec are needed. Evaporation cooling requires water in quantities of 0.8-1 cu m/sec for 1000 MW nuclear plants and 0.4-0.6 cu m/sec for fossil-fuel-fired plants.

20204 APTIC NO. 39290

Byrd, J. F. and E. L. Dewey

VENTURI SCRUBBER IN ODOR CONTROL. *Chem. Eng. Progr., 53(9):447- 451, Sept. 1957. 6 refs.*

The effectiveness and economics of a venturi scrubber for use in the soap and detergent industry are discussed with regard to a mildly odorous exhaust which carries entrained product fines. The basic problem in the pilot unit tests was the choice of a parameter as a criterion of performance. For a time, the measurement of light transmission through the fume exhaust was the accepted method, but although good design data were obtained, certain inherent disadvantages of the method indicated that the best criterion of the effectiveness of the venturi scrubber for odor control was actual measured odor reduction. A syringe technique of odor measurement was developed. Operation of the venturi and maintenance requirements are described.

20205 APTIC NO. 38826

Chironis, Nicholas P.

TAILOR-MADE FOAM ATTRACTS, CONSUMES COAL DUST PARTICLES. *Coal Age, 77(4):105-108, April 1972.*

A new foam with a plastic-base binder to give it toughness, with electrolytic molecules to attract coal particles, and with a detergent-type surfactant to provide it with super-wetting properties, is showing remarkable ability to suppress respirable dust in coal mines. Developed by Monsanto Research Corp. under a research grant by the Bureau of Mines, the foam is capable of expanding, engulfing, and consuming the minute coal particles as soon as they are born under the grind of coal cutters. As the foam dries, it clusters the particles tightly together to form tiny conglomerates which resist becoming aerosolized in subsequent handling operations. coal dust suppression and characteristics of the foam are discussed.

20206 APTIC NO. 39128

Chironis, Nicholas P.

ANOTHER HAT IN THE ENFRGY RING...FMC S COAL-TO-GAS/OIL PROCESS. *Coal Age, 76(12):80-82, Dec. 1971. 1 ref.*

A key consideration among government planners today is how to provide for an adequate supply of energy at the lowest cost and with the least harm to the environment. There is little doubt that the gasification of coal is one of the most practical means of fulfilling such needs. Researchers at the FMC Corp. have found a way to expand a previous process to produce not only a high quality crude oil, but also, simultaneously synthetic gas. On the balance sheet, the credit obtained from selling the crude oil will offset part of the cost of producing the synthetic gas, with the result that FMC believes that its new coal-to-gas (COGAS) process offers the potential of lower priced gas than that from other synthetic gas processes under development. COGAS operates at low pressures--in the 50 psig region--and it consumes air instead of oxygen to supply the necessary heat energy for the steam-carbon reaction to produce synthetic gas. The resulting crude oil, to be sold to petroleum refineries, is more naphthenic and aromatic than the natural crudes--which is an important asset, especially in terms of reaching high octane numbers without the need for lead additives. Basics of the process are presented.

20207 APTIC NO. 39375

Chulakov P. Ch. and U. B. Baytasov

EFFECTIVITY IN APPLYING DUST-WETTING ADDITIONS. *(Effektivnost primeneniya pylesmachivayushchikh dobavok). Text in Russian. Izv. Vysshikh. Uchebn. Zavedenii, Gorn. Zh. (Sverdlovsk), 13(6):66-68, 1970. 4 refs.*

The effects of two different alkysulfonated surface-active agents in aqueous solutions on the efficiency of cyclone-type dust collectors with venturi tubes were studied. The solutions of concentrations of 0.001%, 0.01%, and 0.1% showed slightly decreased surface tension with increased concentration. The above agents improved the efficiency at low air flow rates in the venturi tube. With an initial dust concentration of 70 mg/cu m and a flow rate of 50.3 m/sec, the final dust concentrations were reduced from 3.6 mg/cu m to 1.56 and 1.67 mg/cu m, respectively, by the two different surface-active agents in 0.001% concentration. Increases in the air flow rate resulted, however, in decreased efficiency, since finely dispersed dust could escape with bubbles formed due to foamings. Thus, an optimum flow rate to prevent foaming is required. Since the surface active properties of sulfonated agents are impaired with time, due to the formation of insoluble salts, such products should not be used longer than 6-8 hr.

20208 APTIC NO. 39671

Clair, Hillary W. St.

THEORY AND BASIC PRINCIPLES OF THE SONIC SMOKE FLOCCULATOR. *Interdepartmental Committee on Air Pollution, Washington, D. C.. Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950. p. 382-387. 19 refs. (May 3-5, Louis C. McCabe, ed.)*

Developments leading to the recent application of sonic flocculation to the precipitation of acid fogs, carbon blacks, and other industrial aerosols for smoke and dust control are summarized, methods of generating high-frequency sound are considered. Generation by a pulsating gas stream is simpler, more reliable, and less expensive than pulsating vibrators for large-scale generation of sound and particularly for industrial uses. In the absence to date of any quantitative theory for sonic agglomeration, the behavior of suspended particles in a vibrating gas is discussed as a combination of covibration of the particles, hydrodynamic forces between neighboring particles, and radiation pressure. Problems requiring basic research and theoretical development are recommended.

20209 APTIC NO. 38802

Cleveland, Paul R.

ANALYSIS OF ALTERNATIVE SOLUTIONS TO THE MOTOR VEHICLE AIR POLLUTION PROBLEM – STUDY DESIGN PHASE. (FINAL REPORT). *Booz, Allen Applied Research, Inc., Bethesda, Md., Environmental Design and Control Div., Federal Highway Administration Contract FH-11-7531, 142p., Jan. 15, 1971. 170 refs.*

NTIS: PB 201883

The design of a research program involving alternative solutions to alleviate air pollution from motor vehicle and highway related sources is presented. The nature and magnitude of the vehicular air pollution problem is examined. The four principal groups of vehicle-produced primary pollutants are hydrocarbons, nitrogen oxides, carbon monoxide, and particulates. Substantial amounts of sulfur dioxide, boron, and lead which are added to gasolines; road grits such as asbestos and de-icing compounds; and pollutants resulting from highway construction operations add to the problem. Approaches for a detailed research program include the simulation model, the representative test and control site approach, technology assessment, and a combination of these. The program outlined consists of state-of-the-art surveys and assessments to provide quick, interim planning and decision-making capability; detailed pollution measurement programs and studies dealing with the economic, social, and environmental effects of air pollution and consequences of pollution abatement to provide data for simulation modeling and cost-benefit assessments; and mathematical modeling studies to provide a complete and flexible planning and decision-making capability in the future. A survey of current research is included. (Author abstract modified)

20210 APTIC NO. 38748

Cornett, Milan S.

UNITARY PORTABLE AIR CLEANER. *(Assignee not given.) U. S. Pat. 3,618,302. 4p., Nov. 9, 1971. 11 refs. (Appl. Oct. 17, 1969, 3 claims).*

An air cleaner is presented that embodies a closed system comprising a centrifugal dust separator with an internal spark arrester constituting a pre-cleaner. An after-filter recirculates the air discharged from the pre-cleaner and further cleans the recirculated air before directing the cleaned air to the inlet of the centrifugal separator. The portable device is compact, self cleaning, and clog-free. (Author abstract modified)

20211 APTIC NO. 39486

Coutant, R. W., R. Simon, B. Campbell, and R. E. Barrett

INVESTIGATION OF THE REACTIVITY OF LIMESTONE AND DOLOMITE FOR CAPTURING SO2 FROM FLUE GAS. (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Air Pollution Control Office Contract CPA-70-111, 82p., Oct. 1, 1971. 10 refs.*

NTIS: PB 204385

The reaction between limestone and sulfur dioxide as applied to the dry-limestone injection process for SO2 control in conventional power-generating boilers was studied. An empirical model was developed for the limestone SO2 reaction, and this model was used for correlation of previous data as well as current data. Changes in reactivity caused by variation in the time-temperature profile were predominantly related to residence time. The maximum utilization of a limestone is proportional to the square root of the SO2 concentration, which is consistent with observations of other workers studying the reaction under simulated boiler conditions. Calcination under simulated boiler conditions leads to generation of relatively small pores and high surface areas, and the reactivity of a particular limestone is directly proportional to the surface area developed by a given reaction condition, provided that other factors, such as particle size, are taken into account. The theoretical model of the calcination process was extended to enable prediction of calcination rates, particle temperatures, circumferential stresses, and pressures within a limestone particle during calcination under simulated boiler conditions. The limestone process would be relatively mor effective in application with flue gases containing high concentrations of SO2.

20212 APTIC NO. 39691

Cralley, Lewis J.

ATMOSPHERIC POLLUTION CONTROL IN PETROLEUM REFINERIES. *Am. Ind. Hyg. Assoc. Quart., 11(1):51-54, March 1950. 7 refs.*

The major contaminants released into the air from specific processes and operations of petroleum refineries and methods of control are reviewed. The control of sulfur gases, whether as hydrogen sulfide, organic compounds, e.g., mercaptans, mono and disulfides, and thiophenes, or sulfur dioxide, is a major problem. Crude oils also contain considerable quantities of inorganic materials, e.g., arsenic, phosphorus, silicon, vanadium, lead, manganese, chromium, barium, strontium, nickel, titanium, and sodium and calcium chloride. Along with these, catalysts used in the processes may escape into the air either as a carry-over with gaseous compounds or in regeneration processes. Less significant contamination may be due to leaks and spills; oil mists; processing of petroleum chemical products; and maintenance and repair shop operations. For controlling emissions from crude oil storage, venting the tanks and flaring the gases or passing the vented gases through an alkali scrubber are effective. In primary fractionation, methods for the removal of sulfur gases include conventional scrubbers using a caustic solution and/or the conversion of the contaminants to elemental sulfur for by-product recovery. Low-temperature catalytic procedures and hydrogenation to remove sulfur compounds and scrubbing towers to treat mercaptans and hydrogen sulfide may be used in the purification process.

20213 APTIC NO. 38806

Curchod, Jacques

SYSTEM FOR PURIFYING A PARTICLE-LADEN GASEOUS STREAM. *(Curchod Baeriswyl and Cie, S. A., Rolle (Switzerland)) U. S. Pat. 3,618,298. 4p., Nov. 9, 1971. 11 refs. (Appl. April 6, 1970, 7 claims).*

An improved installation is presented which comprises an enclosure partially fillable with liquid to a certain level when the installation is at rest. An inlet and outlet are located above that level and the outlet cooperates with such means for drawing a gaseous stream. A deflector having a lower surface below the predetermined level is located between the inlet and outlet so as to direct a gas stream on to the liquid approximately perpendicular to the deflector s surface. A saw-tooth baffle follows the deflector, and each lower edge of the baffle downstream of the deflector is successively higher than the lower surface of the deflector. The baffles may be at least partially fixed to a movable cover to ease cleaning of the installation. Two sets of deflectors and baffles may be placed converging together in V formation to increase the area of contact of the gas with the liquid. (Author abstract modified)

20214 APTIC NO. 39748

DAragon, H. J.

PROTECTIVE STORAGE AT PIPE LINE TERMINALS. *Petroleum Eng., 1944:146, 148, 150, March, 1944.*

The use of evaporation saving equipment in one form or another is accepted practice in storing volatile petroleum products at every point along the line, from the tank farm and refinery to the bulk station and consumer. Evaporation losses from the conventional storage tank with a fixed (cone) roof may be classifed as windage loss, breathing loss, boiling loss, and filling loss. Windage losses from tanks can be completely eliminated by the simple expedient of installing pressure and vacuum valves and ascertaining that all roof seams and connections are gas-tight. Breathing losses from single units can be entirely eliminated by storing product in tanks equipped with variable space or expansion roofs. The variable vapor space in such tanks is to provide for the maximum expansion of vapors caused by daily changes in temperature. Breathing losses may be reduced to some extent by employing various means of diminishing temperature variations within the tank. Other methods of controlling evaporation losses are indicated, as well as the physical laws which evaporation of volatile liquids follow.

20215 APTIC NO. 38790

Denisov, V. V., K. G. Il in, and G. V. Denisova

A CONTRIBUTION TO THE CATALYTIC REMOVAL OF SO2 FROM GASES. *(K issledovaniyu protsessa kataliticheskoy ochistki gazov ot SO2). Text in Russian. Khim. Khim. Tekhnol., 14(11):1695-1697, 1971. 6 refs.*

Theoretically possible (equilibrium) degrees of the conversion of sulfur dioxide to sulfur trioxide were calculated for the catalytic oxidation of gas mixtures with different concentrations of SO2 (0.3-1.5%) and oxygen (1-20%) in a temperature range of 400-550 C. Low temperatures (400-500 C) characterized by high degrees of contact were found to be best. Using a modified version of the Boreskov equation, the duration of the contact between gas and a vanadium catalyst required to reach a given degree of conversion within a range of 70-92% was determined for different oxygen concentrations. A formula is given for determination of the volume of the catalyst required.

20216 APTIC NO. 39050

Denisov, V. V., K. G. Ilin, and G. V. Denisova

CONTRIBUTION TO THE CATALYTIC REMOVAL OF SO2 FROM GASES. *(K issledovaniyu protsessa kataliticheskoy ochistki gazov ot SO2). Text in Russian. Khim. Khim. Tekhnol., 14(11):1695-1697, Nov. 1971. 6 refs.*

The main parameters for the catalytic conversion of sulfur dioxide emitted with hot effluent gases and constituting a below 2.0% concentration are discussed. Equilibrium ratios of SO2 conversion in the presence of vanadium catalysts are calculated for SO2 levels ranging between 0.3 and 1.5% and oxygen concentrations ranging between 1.0-20.0% at gas temperatures ranging from 400 to 550 C, utilizing Boreskov s equation. A modification of this equation allows the calculation of the gas/catalyst contact time required to achieve a 70-92% SO2 conversion into SO3, under various temperature and emitted gas composition conditions. The required catalytic mass volume can be computed according to Amelin s equation. Best results are attained under 400-500 C temperature conditions.

20217 APTIC NO. 38796

Deringer, Hans, Kurt von Kessel, and Paul Radusch

PROCEDURE FOR THE DESULFURIZATION OF ORGANIC SULFUR COMPOUNDS CARRYING VAPORS AND/OR GASES. *(Verfahren zur Entschwefelung von Daempfen und/oder Gasen, die organische Schwefelverbindungen enhalten). Text in German. (Heinrich Koppers G.m.b.H., Essen (West Germany)) W. Ger. Pat. Appl. 1,470,587. 3p., July 20, 1963. (2 claims).*

A method for the removal of organic sulfur compounds from waste gases is presented. The gases are passed over a hydrogenation catalyst at 280-400 C to convert the organic sulfur compounds to hydrogen sulfide and hydrogen, or to a gas containing free hydrogen, and then passed through a coarse grained solid containing less than 5% manganese and 1% iron by weight, based on manganese, until the residual sulfur content is less than 5 ppm. The absorption capacity of the catalyst is maintained over long periods of time through the lowest possible iron content. Similar desulfurization methods using manganese-containing catalysts did not take into account the fact that the iron in the catalyst promotes the formation of manganese sulfate which cannot be regenerated to manganese oxide.

20218 APTIC NO. 39256

Dexter, Gregory M.

ELIMINATION OF KRAFT MILL ODORS. *Paper Trade J., 129(20):78-81, Nov. 1949.*

The sources and strengths of kraft mill odors the use of scrubbers in odor control are discussed. An oxidation tower to be used ahead of the multiple-effect evaporator oxidizes volatile sulfur compounds. An Inka tower could also be used after the usual precipitator to collect any chemicals, organic sulfur compounds, and sulfur dioxide remaining in the waste gases and thus reduce odors from the recovery furnace by 90% or more. Dust or fumes in the stack gases may also be recovered in the Inka tower. The recovery furnace should be somewhat larger than the rated capacity of the mill since lower production costs are usually sought by exceeding the designed capacity of the furnace. The direct-contact evaporators are a source of the odors in the stack gases. One approach to odor removal is to replace the direct-contact evaporator with a larger-capacity multiple-effect evaporator in order to increase the amount of solids in the black liquor from 55 to 65%. Elimination of the direct-contact evaporator will reduce the moisture content of the gases going to the precipitator below the desirable 19% of the total volume. This condition can be corrected by blowing steam at about 350 F or higher into the waste gases. A 98%-efficient electrostatic precipitator should replace 90% precipitators. The greater efficiency is justified by increased chemical recovery and reduction of odor. Catalysts and chimney heights are also discussed.

20219 APTIC NO. 39371

Dhondt, R. O. and H. K. Carnahan

NEW BEAVON PROCESS TAKES SULFUR-BEARING COMPOUNDS FROM TAIL GAS. *Oil Gas J., 70(6):66-67, Feb. 7, 1972. (Presented at the Western Gas Processors and Oil Refiners Association Annual Meeting, Los Angeles, Calif., 1971.)*

The Beavon sulfur-removal process is reviewed with respect to operation, efficiency, and economics. Using a catalyst and a combination of hydrogenation, cooling, and wet oxidative extraction, the process reduces tail gas sulfur content to the 200-500 ppm range and recovers sulfur as a high-grade elemental by-product without the disadvantages of the Claus process. Efficiency of conversion of carbonyl sulfide to hydrogen sulfide approached 98.5% of equilibrium at 700 F, and simultaneous conversion of carbon disulfide was essentially complete. Over the period of testing, catalyst activity did not decline. A Stretford section was added to the hydrogenation unit for final purification of the gas by H2S extraction and direct oxidation to sulfur.

20220 APTIC NO. 38999

Dobkina, T. D.

THE EFFICIENCY OF PRELIMINARY COAL GASIFICATION IN GIANT ELECTRIC POWER PRODUCING PLANTS. *(Effektivnost predvaritelnoy gazifikatsii uglya na moshchnykh elektrostantsiyakh). Text in Russian. Energetik. (Moscow), no. 11:108-112, Nov. 1971. 6 refs.*

The efficiency of preliminary coal gasification and cleaning was studied on three different systems and for two different coals. A high-intensity gasification method using a hot brown coal bed has been developed. The three systems, with units of 500 MW, include standard steam turbines and boilers. As the optimum gasification pressure lies at 5-8 bars, expansion gas turbines are provided in all systems. In the first system (steam turbine unit with expansion gas turbine) the gasified products are kept at lwo temperature (770 C). A maximum temperature drop of 240 C is reached in the cleaning system. In the second and third systems (steam turbine unit with expansion gas turbine and gas cooler, and steam turbine unit with high-temperature expansion gas turbine), optimum parameters are applied for the gasification system, and the gasified products leave the cleaning system at a temperature of 1020 C. Due to the high humidity of the gasified fuel, tubular driers are provided in all three systems. Since the gas turbines account for 13.5-19% of the total energy output, the number of units could be reduced from eight to seven. Compared with coal-dust firings, both investment and operating costs were considerably lower for preliminary coal gasification. Coal pulverizing plants and electrostatic filters are unnecessary and internal power consumption is reduced.

20221 APTIC NO. 39249

Doerschuk, V. C.

ELECTRIC ARC STEEL MELTING FURNACE FUME ARRESTMENT. *Iron Steel Engr., 42(3):159-162, March 1965. 7 refs.*

Roof mounted hoods are capable of capturing all fume-laden gases emitted by an electric arc steel melting furnace, but the volume of air which must be drawn into and through a hood is very large relative to the rate of evolution of furnace gases. Such hoods are inexpensive, do not require burning the carbon monoxide produced, and do not affect the quality of the steel. The main features of semi-direct extraction are the use of small hoods mounted over vent holes in the furnace roof and a duct connecting these vents, spout, and door hoods to the main gas offtake. The system gives good fume control when not lancing. In direct extraction, which is relied upon to clear the fumes without interfering with metallurgical conditions, automatic control of furnace pressure is essential in order to get good fume control. This is the only system giving complete clearance of the dense fume produced by high-oxygen rates. Exhaust volume is less than in other systems, access to the furnace is unaffected, eletrode use is unaffected, and furnace roof like may be increased. Heavy maintenance is not needed. Fume control from a 15-ton and a 100-ton, 24-ft furnace is discussed.

20222 APTIC NO. 39716

Doerschuk, V. C.

HOW TO CONTROL EMISSIONS FROM ELECTRIC STEEL MELTING FURNACES. PART I. *Air Eng., 2(9):53-57, Sept. 1960.*

Existing methods for the control of emissions from direct arc steel melting furnaces were studied in 26 companies in the United States. Fans with a capacity of 1,320,000 cfm are used to direct the flow of ventilating air to six general types of emission collecting hoods or roof taps. Ducts carry emissions to cleaners which remove dust particles and fumes. The cleaners may include baghouse filters, water spray towers, and wet disintegrators.

20223 APTIC NO. 39456

Drobot, W., S. Finkler, and D. R. Whitlock

EVALUATION OF THE ATOMICS INTERNATIONAL MOLTEN CARBONATE PROCESS. *Singmaster and Breyer, New York, N. Y., National Air Pollution Control Administration Contract CPA 70-76, 207p., Nov. 30, 1970. 11 refs.*

NTIS: PB 207190

The Molten Carbonate Process for the removal of sulfur oxides from power plant stack gases was evaluated for the base case of an 800 MW plant operating with coal containing 3% sulfur and for the alternate cases of 400 and 1000 MW stations burning fuel with 1-6% sulfur. In essence, the process consists of scrubbing flue gas with a molten mixture of lithium, potassium, and sodium carbonates, followed by the successive conversion of the recovered oxides to sulfides and hydrogen sulfide. The final step, not included in the evaluation, is the production of elemental sulfur from the H2S gas by the Claus process. The evaluation of the base case resulted in an estimated capital cost of $13.4 million to achieve a 95% reduction in sulfur oxide emissions. The capital cost was equivalent to approximately $17/KW of station capacity. This capital cost was equivalent to approximately $17/KW of station capacity. The estimated annual operating cost was about 0.9 mills/station KWH. Operating unit costs at 800 and 1000 MW plant capacity were essentially unchanged for a given coal sulfur content. The unit costs at 400 MW capacity increased significantly. Preliminary cost estimates were also obtained and are given for the removal of sulfur oxides from reverberatory furnace off-gas at a copper smelter. Six major process and engineering problem areas still requiring demonstrated solutions are identified and discussed.

20224 APTIC NO. 38785

Duval, Robert

PROBLEMS OF CARBURETION AND ANTIPOLLUTION. *(Les problemes de carburation et d antipollution). Text in French. Ingrs. Automobile (Paris), no. 1:7-14, Jan. 1972.*

As of September 1972, motor vehicle inspection in France will be based on new regulations establishing strict exhaust emission standards for carbon monoxide and unburned hydrocarbons. A typical test will measure emissions during a prescribed sequence of running speeds in various gear positions. A formula is being applied for the allowable ratio of carbon monoxide to carbon dioxide and their combined content. Research and development efforts to improve combustion conditions relate to the design of the combustion chamber of the carburetor; to the pipe arrangement, with a view to ensuring equal distribution of the combustion mixture to the cylinders; to the ignition system; to devices for ensuring maximum stability of combustion air temperature. New methods of controlling air and fuel supply are discussed as well as automatic speed regulation aimed at reducing the level of CO during acceleration, deceleration, and cruising. A method of utilizing infrared radiation to measure the CO content in exhaust gases is also described.

20225 APTIC NO. 38908

Dyson, William L. and Edward R. Hermann

REDUCTION OF ATMOSPHERIC TOLUENE DIISOCYANATE BY WATER VAPOR. *Am. Ind. Hyg. Assoc. J., 32(11):741-744, Nov. 1971. 11 refs.*

The effect of water vapor on atmospheric toluene diisocyanate was determined quantitatively. Toluene diisocyanate is an important occupational health problem. At 24 C and atmospheric pressure a maximum reduction of 50% was obtained for initial toluene diisocyanate concentrations of 0.4 and 0.034 ppm. The percentage reduction of toluene diisocyanate depended almost solely on the water vapor concentration. However, increased humidity would be only marginally useful as a control method. The need is emphasized for sensitive analytical procedures to measure both toluene diisocyanate and the toluene diisocyanate urea around the threshold limit value of 0.02 ppm. (Author abstract modified)

20226 APTIC NO. 39058

Eberan-Eberhorst, R.

THE AUTOMOBILE AND ENVIRONMENTAL PROTECTION½ (Das Kraftfahrzeug und der Umweltschutz). Text in German. Oesterreichische Ingr. Z. (Vienna), 15(3):63-71, March 1972. 11 refs.

Automobiles account for most of the nitrogen oxide, carbon monoxide, and hydrocarbon emissions in the atmosphere. Annually, U.S. automobiles emit 1.8 million tons of particulate matter, 0.5 million tons sulfur dioxide, 3.1 million tons oxides of nitrogen, 59.6 million tons CO, and 9.7 million tons hydrocarbons. The surprisingly high SO2 emission in Austria of 380.000 tons/yr is mostly due to power generation and 1/13 stems from automobiles. A drastic reduction of the exhaust gas components CO, HC, and NOx can be achieved without reducing the power and without a catalytic afterburner, if the engine cylinder and the exhaust system is used as thermal reactor. By means of this, the CO emission can be reduced from the present 120 to 145 g CO/HPhr to 5 g CO/HPhr. The HC emission can be reduced to zero at higher fuel consumption (250 g/HPhr instead of 204 g/HPhr). The NOx emission can be reduced by operation with a very rich mixture (lamda equals 0.75) or a very lean mixture (lamda equals 1.25). The lean mixture has the advantage that the CO is almost entirely removed. The stringent American regulations concerning exhaust gas emission which are planned to go into effect in 1975/76 cannot be met, however, without the use of reactors and catalysts.

20227 APTIC NO. 39683

Edelen, Earl W., Howard L. Clark, and John L. Hodges

ODOR CONTROL IN LOW ANGELES COUNTY. *Air Repair, 1(3):1-4, Feb. 1952.*

Several examples are given of successful odor pollution control in Los Angeles County, where the principal sources of noxious odors have been fish canneries, paint and varnish works, and chemical plants. Installation of low-temperature dehydration units in the canneries eliminated odors from burned fish meal; at the same time 15% more meal was produced and the nutritional value, and hence the market value, of the product increased. Most paint and varnish plants in the Los Angeles area employ scrubbers to reduce odors from acrolein, other aldehydes, and fatty acids; however incineration is the surest and most efficient method, although more expensive. Since controls were established, the large number of odor nuisance complaints has decreased to about one each month, most of which are caused by equipment breakdowns or careless operation.

20228 APTIC NO. 39391

Elenkov, D., A. Assenov, and G. Grozev

SULFUR DIOXIDE SORPTION BY AN ADSORBENT OBTAINED FROM THE XYLITE COMPONENT OF LIGNITE. *(Schwefeldioxid-Sorption an ein Adsorbens aus dem Xylitanteil der Lignitkohly). Text in German. Wasser Luft Betrieb, 15(10):363-366, Oct. 1971. 11 refs.*

Adsorption-desorption properties as well as effects of temperature, humidity, and grain size on the adsorbing capacity of a low-temperature coke from the xylite component of lignite were studied. The adsorption tests were carried out with a waste gas containing 0.4-0.6% SO2 by volume. Increased temperatures up to a limit of 50 C caused rapid increase in the adsorbing capacity, while further temperature rises had only minor effects. Incrreased humidity resulted in an increase in adsorption up to 100 C, and the adsorption was always better with than without vapor (applied in amounts of 6-8 g/cu m). Tests with two different grain sizes (3-4 mm and 4-6 mm at 25 and 50 C, respectively), revealed increased adsortoion with decreasing grain size. The regeneration tests, carried out at 450 C in steady nitrogen current, revealed a relationship between adsorption tmeperature and regeneration. The adsorbing capacity showed steady increase during the first regeneration cycles to reach a maximum of about three times the original value, and then decreased gradually. Comparative tests revealed superiority of customary activated carbons to the low-temperature coke, except at high temperatures.

20229 **APTIC NO. 39630**

Engels, Gerhard and Ekkehard Weber

CUPOLA EMISSION CONTROL. *(Kupolofenentstaubung). Duesseldorf, Giesserei-Verlag G.M.B.H., 1967. 166 refs. (Translated from German by Ram Uberoi. Gray and Ductile Iron Founders Society, Cleveland, Ohio, 196p., May 1969.*

The regulations of the German Federal Republic pertinent to control of air pollution from cupolas are presented. Technical guidelines for air pollution control, the licensing of new plants, and emissions standards and operating criteria are considered. Relationships between the mode of cupola operation and the quantity and nature of cupola dust are indicated. Gravitational, inertial, and centrifugal type dust collectors are considered for cleaning top gas and waste gas. Filters, wet cleaners, and electrostatic precipitators are also considered. Design criteria and operating variables are presented. Maintenance, costs, and advantages and disadvantages of the various cleaning methods are indicated. Selection of measuring points and the basic parameters and principles for measurements are briefly discussed.

20230 **APTIC NO. 39251**

Epure, Stefan

DESIGN CONSIDERATION OF BAG HOUSES FOR USE IN ELECTRIC FURNACE OPERATIONS. *Iron Steel Engr., 37(12):173-177, Sept. 1960.*

Design of adequate gas cleaning equipment should be based on the actual operating cycle in electric furnace operations in steel making. During the meltdown period the production rate is higher and depends on the furnace transformer size. Collection systems must also be considered. The three systems available are canopy-type hoods, located above the furnace; indirect collection by means of roofring hoods; and direct collection, by aspiring directly the fumes generated within the furnace through a water-jacketed opening in the roof. The baghouse and humid electrostatic precipitator are the most suitable types of equipment for use in connection with electric furnace operation. Mathematical analysis of the processing of electric furnace gases in a baghouse using silicon-impregnated bags suggests an air dilution of the effluent in the ratio 2.5, to 1.0, thus reducing the temperautre from 3000 to 950 F; a primary cooling of the resulting gas mixture from 950 to 750 F, by means of automatically- controlled spraying nozzles within a spark box; a secondary cooling of the gases from 750 to 350 F, by means of a radiating duct of a radiating surface of 95 P sq ft; and a cleaning of the resulting effluent at 350 F, in a silicone-impregnated baghouse, to handle a volume of 800 P cfm.

20231 **APTIC NO. 39698**

Erickson, O. E.

ELECTRIC STEEL FOUNDRIES CONTROL DUST EMISSIONS IN LOS ANGELES AREA. *J. Metals, 5(12):1625-1626, Dec. 1953.*

Equipment used in electric steel foundries to control dust emissions in the Los Angeles area was described. Wet collectors are unable to handle dust particles less than five micron in size. The air stream from electric furnaces contains some sulfur compounds which caused corrosion in the equipment. Baghouse collectors are also not successful. Despite the high collection efficiency, the dust tends to adhere to the fabrics. Electrostatic precipitators cannot put enough charge on the particles to make them stick to the collecting devices in the filter and to prevent them from passing on to the atmosphere. This is particularly true of the air stream from electric furnances because of the high molecular activity of the particles at that high temperature. The most successful system is a tube-type bag filter using Orlon bags and combining an adequate reverse air flow with mechanical shaking. It requires little maintenance or manual cleaning.

20232 **APTIC NO. 39480**

Faith, W. L.

DUST CONTROL IN THE ROCK PRODUCTS PROCESSING INDUSTRY. *Missouri Univ., Columbia, Coll. of Engineering and Missouri Air Conservation Commission, Jefferson City, Control Dusts, Smokes, Noxious Odors, Proc. Annu. Air Pollut. Conf., 3rd, Columbia, Mo., 1970, p. G1-G7. (Nov. 17.)*

Four common types of dust control equipment are applicable in the rock processing industry. The least expensive are cyclone collectors. Next in cost are a wide variety of water scrubbers ranging from simple spray systems to highly effective Venturi-type scrubbers. Cloth filters or baghouses are the next expensive and efficiency usually exceeds 99%. The most expensive type of dust control device is the electrostatic precipitator. To use any of the devices, it is necessary to keep the dust-laden gas stream contained so that it can be directed into the control equipment. Individual processes including Portland cement manufacture, lime manufacture, gypsum products, hot-mix plants, concrete batch plants, expanded aggregate manufacture, and sand and gravel aggregate plants are briefly described.

20233 **APTIC NO. 39331**

Falkenhain, Gerd

THERMAL ELIMINATION OF ORGANIC NITROGEN-CONTAINING SOLVENT VAPORS. *(Thermische Vernichtung organischer stickstoffhaltiger Loesungsmitteldaempfe). Text in German. Wasser Luft Betrieb, 16(4):115-118, April 1972. 3 refs.*

Solvent vapo1rs were passed tangentially and together with secondar air into a combustor where a burner supplied with gas and primary air burned. In a cylindrical afterburner with an expanded clay layer a non-catalytic surface combustion took place. For experiments determining the composition of the waste gases devel5oping at the combustion of solvents, a constant throughput of natural gas of 0.096 cu m/hr as well as a primary air throughput of 0.421 cu m/hr, and a secondary air throughput of 5.1 cu m/hr was selected. Only the solvent concentration mixed to the secondary air was varied. The air-vapor-mixture prior to entry into the combustor had a temperature of 380 C. The oxygen and carbon dioxide concentrations in the waste gas were determined with the MAGNOS and ORSAT analyzers, a flame ionization detector was used for determination of the unburned hydrocarbon concentration. Draeger indicators were used r nitric oxide, nitrogen dioxide, hydrogen cyanide, and ammonia analyses. The solvents burned were dimethylformamide, n-butylamine, and nitromethane. Dimethylf5ormamide and butylamine could best be converted to harmless products, most of the nitrogen bound in the solvents could be converted to molecular trogen. Combustion of nitromethane does not seem advisable, since high nitromethane concentrations were measured in the waste gas plus high concentrations of the oxides of nitrogen.

20234 **APTIC NO. 39158**

Fenley, Joseph J.

ECOLOGISTS TARGET ALSO A BIG POLLUTION FIGHTER. *Ind. Week, 173(4):41-48, April 24, 1972.*

In the pollution field, a company can be both part of the problem and part of the solution simultaneously. The Union Carbide Corporation contributes to air pollution at several of its plants but is also involved in developing processes to help solve problems in the air, water, and solid pollution areas. Air pollution control equipment includes molecular sieve technology to prevent nitrogen oxide and sulfur oxide emissions, on incinerators that do not produce air pollutants, improved waste water treatment, industrial solid waste disposal, octane-rating improvement of low-lead gasolines, and mercury, sulfur dioxide, and NOx removal from industrial gas streams.

20235 APTIC NO. 38798

Ferrari, Domenic C. and Carl G. Bertram

METHOD AND APPARATUS FOR REMOVAL OF ORGANICS FROM CHEMICAL WASTE GASES. *(Badger Co., Inc., Cambridge, Mass.) U. S. Pat. 3,624,984. 8p., Dec. 7, 1971. 7 refs. (Appl. June 15, 1970, 26 claims).*

One-way scrubbers for waste gases from chemical plants, particularly waste gases from phthalic anhydride and maleic anhydride plants, create a water pollution problem; thermal gas incinerators pose an explosion hazard. Both problems are eliminated by washing the gases in a wet, preferably countercurrently operated, scrubber using recycled water to concentrate the organic pollutants. A concentrated liquid purge (blowdown) from the scrubber recirculating loop is directed to a thermal incinerator where the purge is vaporized and the organic pollutants (maleic acid, phthalic acid, benozic acid, and napthaquinone) are oxidized to harmless compounds such as carbon dioxide and water. The method achieves 98-99% removal of the organic pollutants.

20236 APTIC NO. 38874

Fialkov, Yu. G., M. L. Cherkasskiy, V. S. Malts, and B. P. Gromov

INDUSTRIAL HIGH-SPEED HOLLOW SCRUBBER FOR ALUMINUM MANUFACTURING-GENERATED GAS CLEANING. *(Promyshlennyy polyy skorostnoy skrubber dlya ochitski gazov alyuminiyevogo proizvodstva). Text in Russian. Tsvetn. Metall., no. 12:28-31, Dec. 1971. 4 refs.*

Scrubbers with diameters exceeding 5 m used in electrolysis shops were investigated. Before scrubber treatment the gas to be cleaned contained, per N cu m, 10-30 mg hydrogen fluoride, 30-100 mg dust, and 10-60 mg tar. The scrubber was sprayed with soda solution as an absorbing agent. Hydrogen fluoride absorption was dependent on the linear gas velocity and the spray density. The efficiency could be influenced by the site and direction of the spray. Spraying from the topside gave the best result up to a gas speed of 5 m/sec. The effects of the spray density were studied under various spraying conditions. Efficiencies of 97.5-98.0% were reached with a density of 37 cu m/sq m.hour. Single-stage dust separation and scrubbing were applied in the hollow scrubber. Increased gas speed and spray density resulted in increased efficiency, while the nozzle placement had only a slight influence. The residual dust concentration was 30-60 mg/N cu m. Efficiency for total dust was 73% with a gas speed of 3.3 m/sec and a spray of 30 cu m/sq m.hour. Efficiencies above 90% can be reached with appropriate gas velocities and spray density. The drop separator had a hydraulic resistance of 15-20 kg/sq m.

20237 APTIC NO. 39303

First, Melvin W.

EFFECTIVENESS OF ODOR COUNTERACTANTS FOR THE TREATMENT OF STACK GASES. *J. Air Pollution Control Assoc., 9(1):28-31, May 1959. 2 refs. (Presented at the Air Pollution Control Association, New England Section Technical Meeting, 1st, Providence, R. I., May 8, 1957.)*

The effectiveness of odor counteractants for stack gas effluents was evaluated by an odor panel of 10 individuals stationed downwind of a plant discharging 95,000-145,000 cfm of stack gas containing 100-200 ppm of hydrogen sulfide and sulfur dioxide plus traces of mercaptans. Reactions to the stack odor were overwhelmingly unfavorable when the odor counteractant was used at the recommended dosage rate. This reaction did not differ significantly from preferences expressed when no counteractant was used. Only when the odor counteractant was used at double the recommended rate did a majority of the panel consider the resultant odor not objectionable. When the counteractant was turned on at double the recommended rate, every member of the panel was aware of its presence. Even if treatment costs at double the normal rate of application were not prohibitive, it is doubtful that the public would find the odor of counteractant chemicals acceptable for a long period.

20238 APTIC NO. 39034

Fodor, L.

REMOVING THE CO BY WASHING WITH CUPRO-AMMONIACAL SOLUTIONS. *(Indepartarea CO prin spalare cu solutii cupro-amoniacale). Text in Romanian. Rev. Chim. (Bucharest), 23(2):85-92, Feb. 1972. 20 refs.*

Utilization of ammonium copper solutions for the removal of carbon monoxide from gas mixtures is based on the property of monovalent copper salts to complex CO under certain conditions. The absorption capacity of these solutions under specific temperature and pressure conditions is best defined by Javoronkov s equation. The process is enhanced under increased gas pressure and partial CO pressure conditions and under low temperatures. However, temperatures should never be carried below certain limits to avoid crystallization of the copper salt. Minimum operating temperatures will thus depend on the freezing point of the utilized ammonium copper solution. Increased active NH3/Cu ion ratios of the absorbing solution constitute another determining factor for the absorption rate of CO. Temperature, constitution, density, viscosity, and surface tension of the ammonium copper solution constitute the main criteria to be observed in designing the respective absorption facility. Included are sketches and operational details of the installation.

20239 APTIC NO. 39162

Foitzick, Jan

PROBLEMS OF MAINTAINING CLEAN AIR. *(Probleme der Luftreinhaltung). Text in German. Bl. Nat. Umweltschutz, 52(2):34-35, April 1972.*

Some problems involved in controlling pollutant emissions from automobiles, domestic heaters, and industries are reviewed. It cannot be expected that these emissions will be reduced through legal measures; individual initiative is required. Proper maintenance of domestic oil-fired heaters will reduce the emissions and improve the efficiency of operation. In the case of automobile exhausts, the use of liquid or natural gas as fuel is best at present. Industries emit large quantities of waste gases. Continuous monitoring of the composition of the waste gases, as in operation in some large-scale monitoring systems in Munich and the industrial areas of Ingolstadt/Neustadt, Burghausesn and Nuremberg/FuerthErlangen, is a necessary step toward control.

20240 APTIC NO. 39746

Forgey, H. H. and T. E. Kobett

CO BOILER SUPPLEMENTS REFINERY STEAM SUPPLY. *Oil Gas J., 57(29):138, 140-141, 143, 145, July 13, 1959. 8 refs.*

To supply the need for additional steam capacity at the Sugar Creek refinery of Standard Oil Co., a carbon monoxide boiler was installed for operation on the regenerator flue gas from the existing fluid catalytic cracking unit. The CO-boiler installation consists of an outdoor heat-recovery steam-generating unit. Flue gas from the fluid catalytic cracking unit is supplied to a cylindrical water-cooled furnace where supplementary fuel is also burned to maintain a minimum furnace temperature of 1500 F to insure stable ignition of CO-bearing gas. This heat-recovery unit can generate a maximum of 250,000 lb/hr of steam. Major items in the installation, in addition to the boiler proper, are a CO gas duct with a double-gate slide valve and two water seal tanks. A small control panel was added in the fluid catalytic cracking unit control room. The boiler feedwater pumps and fans can be started or stopped from the control room. Advantages and costs of a CO boiler are indicated. Heat recovery, burner system, feed-water system, CO boiler, primary and secondary furnaces, superheater, and economizer for the Sugar Creek installation are described.

20241 APTIC NO. 38724

Freel, John

CHEMISORPTION OF SUPPORTED PLATINUM. II. STOICHIOMETRY FOR HYDROGEN, OXYGEN AND CARBON MONOXIDE. *J. Catalysis, 25(1):149-160, April 1972. 24 refs.*

The chemisorption of hydrogen, oxygen and carbon monoxide on supported platinum was studied by a pulse technique; crystallite size was measured independently by electron microscopy. Monolayer coverage on supported platinum crystallites corresponded to the adsorption of one hydrogen atom per surface platinum atom. Most catalysts supported this correlation within + or -20%. The stoichiometry of CO chemisorption on small platinum crystallites was also reasonably consistent with literature data. On platinum silica, CO uptakes were typically some 15% less than corresponding volumes of hydrogen on a molecule/atom basis. Results for platinum-alumina were broadly similar. Volumes of hydrogen and oxygen chemisorbed on supported platinum catalysts varied widely with respect to one another, probably due to changes in the stoichiometry of oxygen chemisorption on platinum as a result of the thermal history of the sample. Oxygen uptakes substantially lower than those of hydrogen were obtained after reduction for 1 hr at 500 C, while almost equal volumes of hydrogen and oxygen were adsorbed after 15 hr in hydrogen at 500 C. The phenomenon was largely independent of crystallite size and was tentatively attributed to changes of the platinum surface from a defective form to an equilibrated structure of minimum surface energy. (Author abstract modified)

20242 APTIC NO. 39076

Freund, E.

STATE OF THE ART OF OIL BURNERS FOR THE INDUSTRIAL HEAT SUPPLY. *(Stand der Technik von Oelbrennern fuer die industrielle Waermeversorgung). Text in German. Freiberger Forschungsh. A, no. 503:19-33, 1972. 6 refs.*

There is an increasing tendency toward using fuel oil instead of solid fuels in the German Democratic Republic. The advantages of fuel oils for the operation of steam boilers and industrial furnaces include the absence of ash and soot. Heavy fuel oils have the disadvantage of containing between 2.5 and 3.5% sulfur which may lead to low-temperature corrosion. Also, various oxides of the fuel oil ash have low melting points which might cause high-temperature corrosion. A near stoichiometric combustion, i.e., operation with an air surplus of about 0 to 1%, reduces the sulfur trioxide concentration of the flue gas and the acid dew point which is a criterium for the beginning corrosion. A combustion with a fuel to air ratio of lambda 1 also prevents high-temperature corrosion by increasing the flame temperature and by accelerating the combustion process. The sulfuric acid condensation is reduced. In order to achieve a near stoichiometric combustion the burner must maintain a constant atomization viscosity which is achieved by means of preheating the fuel oil; the atomized particles must be extremely fine; the velocity distribution across the burner exit must be uniform; turbulence must be large to guarantee good mixing. All these requirements can be fulfilled by a new universal pressure-atomizer. A description of this burner is given.

20243 APTIC NO. 39156

Fulford, G. D., M. Moo-Young, and M. Babu

THERMOPHORETIC ACCELERATION OF PARTICLE DEPOSITION FROM LAMINAR AIR STREAMS. *Can. J. Chem. Eng., 49(5):553-556, Oct. 1971. 14 refs.*

The use of thermophoretic forces to accelerate the deposition of particles up to about 30 micron in diameter from a horizontal laminar air stream was studied, with specific application to dust collectors. A temperature gradient across the direction of flow of a laminar flow air stream accelerated deposition of small particles in the stream. An empirical equation for the effect is presented based on the present results and on earlier results for smaller particles in similar flow conditions. The empirical correlation may be used to improve the efficiency of filters, cyclones, electrostatic precipitators, centrifugal separators, and dust collectors.

20244 APTIC NO. 39358

Fussell, D. R.

AIR POLLUTION AND THE MOTOR VEHICLE--WHAT NEXT? Petrol. Rev., 25(291):103-113, March 1971. 59 refs.

The current situation regarding automotive emission control and legislation in the United States and Europe is considered. Since pollution from reciprocating gasoline-powered motor vehicles can be reduced to very low levels using advanced emission control systems, gasoline engines are likely to remain the principal prime mover well into the next decade. One of the major problems still to be faced is the maintenance and surveillance of emission controlled vehicles. The principal pollutant in the blow-by gas consists of unburned hydrocarbons. Control of blow-by emission is possible using a crankcase ventilation system which feeds the gases back into the induction manifold where they can be consumed in the engine. Evaporation losses consist of the more volatile gasoline hydrocarbons. Control is achieved when the car is stationary either by absorption in a charcoal filled canister or by storage in the crankcase where the gasoline vapors can be partially absorbed in the engine oil. Stored vapors are then ducted to the intake manifold where they can be consumed during subsequent engine operation. Exhaust emission control systems fall roughly into two categories: those relying solely on improved mixture distribution, improved combustion conditions, and breathing of the engine; and those systems which also incorporate an exhaust manifold air injection system. Design modifications to minimize quench are being incorporated into many new engines, as well as double inlet manifolds and various fuel injection systems. Engine design to achieve maximum power is discussed, and future emission control systems are considered. Catalytic devices, particulate control, and alternative power sources are discussed. Turbines and electric vehicles are mentioned. Fuel quality, lead reduction, and alternative fuels are considered. Compressed natural gas, liquefied natural gas, and liquefied petroleum gas (propane and butane) are cited. Economic factors are mentioned.

20245 APTIC NO. 39226

Galeano, Sergio F., Don C. Kahn, and Reynold A. Mack

AIR POLLUTION - FREE OPERATION OF A NSSC RECOVERY FURNACE. *Technical Assoc. of the Pulp and Paper Industry, New York, Tappi Engineering Conf., 25th, Proc., Denver, Colo., 1970, p. 97-105. 11 refs. (Oct. 27, Paper 4-2.)*

Differences between the spent liquors from neutral sulfite semi-chemical pulping and kraft pulping are cited, and the operation of a neutral sulfite semi-chemical pulping recovery furnace for air pollution-free operation is described. It was possible to modify the operation of the furnace by applying fundamental principles of thermodynamics and full knowledge of liquor characteristics. Proper instrumentation and control are required for the operation of the furnace. Proper turbulence in the secondary zone is an essential factor, and a proper sodium/sulfur ratio must exist in the liquor for a desired level of sulfur dioxide emissions. (Author conclusions modified)

20246 APTIC NO. 38719

Gandhi, H. S. and M. Shelef

THE ADSORPTION OF NITRIC OXIDE AND CARBON MONOXIDE IN NICKEL OXIDE. *J. Catalysis, 24(2):241-249, Feb. 1972. 16 refs.*

Adsorption isotherms and rates for nitric oxide and carbon monoxide chemisorption were measured on supported and unsupported nickel oxide samples in the 0-140 C temperature range. The isotherms are of the Freundlich type in the pressure range from 1-125 Torr. Monolayer coverage is attained at 110 Torr for the NO adsorption and at 530 Torr for the CO adsorption. The uptake at monolayer coverage in CO adsorption is approximately 30% smaller than the corresponding NO amount, indicating that about 1/3 of the adsorbed CO molecules are present in the bridged form. There is a 1:1 correspondence between adsorbed NO molecules and Ni atoms on the surface. The chemisorption rate of both adsorbates is described by the Elovich plots, which are more complex for CO than for NO. In the investigated temperature range, the rate of chemisorption and the heat of chemisorption are higher for NO than for CO. The rates of NO chemisorption for the transition metal oxides studies so far are, in decreasing order, iron oxide, chromium oxide, and nickel oxide. (Author absract modified)

20247 APTIC NO. 39092

Gandrud, Bruce W. and Allan L. Lazrus

DESIGN OF SYSTEM FOR REMOVING WATER-SOLUBLE MATERIALS FROM IPC-1478 FILTER PAPER. *Environ. Sci. Technol., 6(5):455-457, May 1972. 5 refs.*

A system was designed for substantially reducing the water-soluble materials contained in IPC-1478 filter paper used in particulate sampling. The cleansing process involves four procedures: loading, washing, drying, and unloading of the filter paper. Preliminary flow rate and collection efficiency experiments have shown that the procedure does not affect these characteristics. The present limitation is the time involved. (Author abstract modified)

20248 APTIC NO. 38951

Gardenier, Hugh E.

PROCESS AND APPARATUS FOR CLEANING AND PUMPING CONTAMINATED INDUSTRIAL GASES. *(Assignee not given.) U. S. Pat. 3,613,333. 7p., Oct. 19, 1971. 7 refs. (Appl. July 17, 1969, 21 claims).*

Filter systems and wet scrubbers represent the current basic approaches to the problem of handling hot contaminated industrial gases. Both systems work satisfactorily but installation, operating and maintenance costs are high. The present invention efficiently removes contaminants from industrial gases with equipment of low installation costs and substantially reduced operating costs. Contaminant-containing gases are indirectly heat exchanged with liquid, thereby raising the temperature of the liquid which is then introduced into the hot gas downstream of the point of heat exchange under conditions of elevated pressure and temperature. The resulting vaporized and atomized liquid entraps the contaminants to form a mixture which is passed to a separator from which gas substantially free of pollutants is exhausted to the atmosphere. The liquid is purified in filters or settling basins and then recycled through the indirect heat exchange medium. A low-pressure duct for pumping gases through the system eliminates the need of a fan.

20249 APTIC NO. 39404

Gartenmann, E.

THE POSSIBILITIES OF REDUCING THE LEAD CONTENT IN GASOLINE FOR AUTOMOBILES. *(Ueber die Moeglichkeiten der Herabsetzung des Bleigehaltes in den Benzinen fuer motorische Zwecke). Text in German. Bull. Eidgenoess. Gesundheitsamtes, Beilage B, no.3:37-76, March 1971.*

It is technically possible to produce high-octane lead-free gasoline in sufficient quantities. In Western Europe deep catalytic reforming of certain distillation fractions and isomerozation of light gasolines is prevalent; in the U. S. the costly catalytic cracking of gas and of heavy oils and olefin alkylation are the principal processes used to produce high-octane lead-free gasoline. Some plant capacity is available (for special gasolines and petrochemical products) but it is insufficient and the equipment is old. To substitute all leaded gasoline with high-octane lead-free gasoline would require a 5% higher volume of crude oil and a fifty-fold quantity of platinum. In the U. S. the necessary investment would run to $4 billion, the European investment would be comparable. In Switzerland the necessary investment would be $2 billion. High-octane lead-free gasoline will contain more aromatic hydrocarbons, less olefins, and less than 5% benzol. Smog formation from lead-free gasolines would increase by 25%, emission of the carcinogenic benzopyrene would not increase. Engine power loss with low-lead gasoline (0.2 Pb/l) is 10%. Small European cars which rely on a high compression ratio require high-octane gasoline and cannot be run on regular gas. Thus the reduction of lead in gasoline in Europe must occur gradually with a simultaneous adjustment of engines by the manufacturers. The development in Switzerland must of necessit follow that of its neighbors from whom it imports 60% of its gasoline. The tax structure will have to be adjusted to the change in piston displacement dictated by the transition.

20250 APTIC NO. 38958

Gentry, James W.

CHARGING OF AEROSOL BY UNIPOLAR DIFFUSION OF IONS. *Aerosol Sci., vol. 3:65-76, Feb. 1972. 13 refs.*

A minimum-flux criterion for making approximate calculations of the unipolar diffusion charging rates in the free molecule and transition regions is developed. The calculations account for the image term in both regions. Numerical calculations indicate that the predictions of the method agree very well with more exact calculations for the free molecule region. The advantages of the method lie in that the calculations are much less tedious for the free molecule region and may be extended into the transition regions. The correction term for charging in the transition region is a function of both the total charge parameter and the particle radius, in contrast to previously published results. The acquistion of electrical charges by aerosols is of importance in air pollution control, analytical, and natural processes. (Author abstract modified)

20251 APTIC NO. 38726

Gertsen, Pjotr Petrowitsch and Taisia Georgijewna Borzowa Suwernewa

REMOVAL OF NITROGEN OXIDES FROM WASTE GAS. *(Verfahren zur Entfernung von Stickoxiden aus den Abgasen). Text in German. (Perm Polytechnical Inst. (USSR)) W. Ger. Pat. Appl. 2,018,518. 14p., April 17, 1970. 13 refs. (8 claims).*

A process for the removal of nitrogen oxides from waste gases emitted during the production of nitric acid is presented. The waste gases containing 3.84 g/cu m of nitric oxide and 3.16 g/cu m of nitrogen dioxide were passed at 7900 cu m/hr through a lime milk-scrubbed column. The resulting gaseous product, containing 3.84 g/cu m NO and 0.316 g/cu m NO_2, was then passed over granular pyrite, 3-10 mm in grain size, in a water-scrubbed multistep absorber at 0.1 m/sec and 0.25 mole/sq m NO pyrite to produce a gas with 1.07 g/cu m NO. This gas was then mixed with 315 cu m/hr of the producer gas containing 25% carbon monoxide to produce, at 10 second contact time, a gas containing 0.2 g/cu m NO. Compared to similar processes, this method is simple and economical, requiring no expensive catalysts and little energy expense.

20252 APTIC NO. 38742

Gilbert, Traugott

WASTE GAS AND FUEL DESULFURIZATION. FROM THE VIEWPOINT OF AN INSPECTOR OF THE POWER PLANT LICENSING COMMISSION. *(Abgas- und Brennstoffentschwefelung. Aus der Sicht eines Gu-*

tachters im Genehmigungsverfahren). Text in German. Tech. Ueberwach. (Duesseldorf), 13(2):38-41, Feb. 1972. 2 refs. (Presented at the HdT, Essen, West Germany, Nov. 11, 1971.)

The Technical Inspection Association for boiler plants has not yet received any request for writing an expert opinion on a plant for waste gas desulfurization. Several requests for evaluating pilot plants for the operation over a limited period of time have been received and were given positive judgements by the Association to promote development in this field. Waste gas desulfurization systems are thus still in the developmental stage, and are not yet in a state of the art. A reduction of sulfur dioxide emissions is presently sought by improvement of the combustion processes and by discharging the waste gases via high stacks. A table lists the most important waste gas desulfurization methods. In the U. S. a flue gas desulfurization system on the basis of wet cleaning with a limestone-dolomite solution is in operation in three hard-coal fired power plants with capacities between 125 and 420 MW. Dry desulfurization processes are primarily being developed in Japan which use activated coal or manganese oxide as an absorbing agent. In the Batersea power plant in London the flue gases are desulfurized by injection of river water.

20253 APTIC NO. 39213

Glaser, C. H.

BLAST FURNACE GAS CLEANING. *Iron Steel Engr., 18(5):46-50, June 1941. (Presented at the American Institute of Steel Engineers Annual Convention, Chicago, Ill., Sept. 24-27, 1940.)*

Developments in blast furnace gas cleaning are traced and processes and types of equipment are described. Equipment falls into four main groups: dust catchers, primary washers, secondary washers, and flue dust recovery. A good dust catcher should remove about 60 to 70% of the dust. The first wet washer units tried to clean gas by impinging it upon the surface of water or by passing the gas through a series of sprays. This method was limited to reducing the dust content to about 0.3 grains/cu ft. Secondary washers include th Theisen washer and Feld washer. The electric precipitator provides low-cost secondary cleaning. The precipitator depends on ionization of the gas to do its work and the electric wind effect of a discharging point.

20254 APTIC NO. 39566

Gokelaere, M. and E. Brun

BURNING AQUEOUS RESIDEUES. A NEW ANTI-POLLUTION MEASURE. *(L incineration des residus aqueux. Une nouvelle arme anti- pollution). Text in French. Chim. Ind., Genie Chim., 104(19): 2420-2421, Nov. 1971.*

A process developed by Elf-E.R.A.P. and Heurtey S.A. in a unit built by Cirma involves emulsification of waste products and sludges, wit h air and a fuel; atomization of the three-phase mixture in a combustion chamber; and combustion and recirculation of gases to achieve uniform temperature distribution and stoichiometric air-fuel ratios. The air streams for the atomization and combustion are injected at pressures of 0.5 bar and 100 mm water column, respectively, and the combustion gases are cooled by expansion and water sprays before release to the atmosphere. The ash particles are then collected. The hourly burning capacity is 2.5 cu m for sludges containing 90% moisture, 50 cu m for stripping gas, and 500 kg for tank bottom residues and slops.

20255 APTIC NO. 39423

Goldman, Arthur

THE ODOR PHASE OF AIR POLLUTION. *Ind. Wastes, 1(6):217-220, July-Aug. 1956. 2 refs.*

The odor problem is now ranked fourth in importance by air pollution officials. Odors can be made more acceptable by treatment with vaporized counteractants, which mix with the odorous air stream by molecular dispersion and air movements and are designed to follow the physical behavior pattern of the odorous elements. The counteractants are vaporized by atomizing them into the air stream with a calibrated atomizing nozzle. The vaporizing points are usually located at the ground level, at the plant rooftop, and at the stack tip in the vicinity of the most odorous effluents. Two specific applications of counteractants are described: reduction of odors in gas warning agents and reduction of odors from rendering plants.

20256 APTIC NO. 39007

Goldschmidt, Klaus

STATE OF DEVELOPMENT OF FLUE GAS DESULFURIZATION. *(Entwicklungsstand der Rauchgas-Entschwefelungsverfahren). Text in German. Elektrizitaetswirtschaft, 71(6):167-171, 1972. (Presented at the 27th Sitzung des VDEW-Fachausschusses Kraft- und Waermetechnik, Esslingen, West Germany, Sept. 23, 1971.)*

The operating principles and the state of development of the following flue gas desulfurization methods are described. The Bergbau-Forschungs method uses coke for adsorption of the sulfur dioxide. The Bischoff methods washes the SO2 out of the gas by means of two scrubbers, a nozzle scrubber and annular slot scrubber, after injection of pulverized lime into the flue gas right ahead of the scrubber entrance. In the Combustion Engineering process pulverized limestone is added to the gas in the combustion chamber. The Grillo method uses a manganese-magnesium oxide compound for SO2 absorption. The French Ungine-Kuhlmann/ Veiritam method uses an ammonia scrubber system for desulfurization of the flue gases. Construction and calculations for a prototype plant operating by the Bergbau-Forschungs method with a capacity for 100,000 to 200,000 cu m flue gases/hr and a desulfurization efficiency of 80% shall be completed by early 1972. The Combustion Engineering process is in operation already in three large plants. Presently it is attempted to increase the efficiency and to eliminate the problems of incrustations and non-uniform injection of the additive. The Grillo process has been tested in a plant for 227,000 cu m flue gas/hr. Problems such as incrustations, clogging of the nozzles, and corrosion were encountered. The French process has been tested in a small plant with 10% of the flue gases from a 250 MW oil-fired plant. Desulfurization efficiencies of 93 to 97% were achieved at a pressure loss of 150 mm water and a 3% sulfur concentration in the oil. No report concerning difficulties has been published. The total costs for the mentioned desulfurization methods are expected to amount to between .16 and .12 cents/kWh for 500 to 800 MW plants.

20257 APTIC NO. 39326

Goldschmidt, Klaus

THE BISCHOFF-PROCESS -- STATE OF DEVELOPMENT. *(Das Bischoff-Verfahren -- Stand der Erprobung). Text in German. Energie Tech., 24(3):89-91, March 1972. 3 refs.*

The Bischoff process combines the effects of a pressure zone and annular slot scrubber. It is used for dust collection and desulfurization of waste gases in the same unit. A pilot plant for a maximum waste gas throughput of 140,000 cu m/hr and a minimum throughput of 90,000 cu m/hr process has been taken into operation in March 1971. The plant has been operated to data mostly with the minimum waste gas throughput. Desulfurization efficiencies of 63.6 and 89.7% were obtained (average for the total period of pilot operation 78.2%). The calcium quantities added ranged from 0.9 to 1.3 times the stoichiometric ratio. The sulfur dioxide concentrations in the uncleaned gas were between 2.9 and 4.6 g/cu m. The waste gas entrance temperature fluctuated between 113 and 147 C. The average dust concentration of the uncleaned gas was 10.6 g/cu m, 47 mg/cu m of the cleaned gas. The experiments with maximum gas throughput are still to come. Difficulties through incrustations in the scrubber and through corrosion of the water pumps arose. These problems can very likely be solved by variation of the nozzle arrangement, the scrubbing water quantities, and the calcium addition. The question of whether dumping the sludge will cause any problems cannot yet be answered, since not enough analytical data are available at the moment. Possibilities of further use of the sludge are being considered.

20258 APTIC NO. 39608

Gower, George H.

RECOMMENDED PRACTICE FOR MOST EFFICIENT USE OF PROCESSED EXHAUST GAS FOR OIL PRODUCTION. *Preprint, American Society of Mechanical Engineers, New York, 5p., 1971. (Presented at the Petroleum Mechanical Engineering with Underwater Technology Conference, Houston, Tex., Sept. 19-23, 1971, Paper 71-Pet-23.)*

The exhaust gas emitted from a hydrocarbon-fueled reciprocating engine, when processed to remove corrosive compounds and elements, is an excellent source of gas for use in producing crude oil from shallow reservoirs. The gas is used as a drive mechanism and, because of its carbon dioxide content, is a viscosity-reducing agent. The injection unit involved has a rated output between 95,000 and 100,000 scfd of gas in the pressure range between 400 and 1000 psig. Operating procedures are described, including application to the huff-puff and needle-valve methods of production; the injection unit, wellhead assembly, field hookup, and 16-well configuration employing the injection unit are diagrammed; and experience with a field-fabricated drip system to remove water in the gas is given.

20259 APTIC NO. 38728

Guentheroth, Hans

APPARATUS FOR COOLING, WET PURIFYING, AND REMOVING DUST FROM GASES. *(Verfahren und Vorrichtung zur Kuehlung, Nassreinigung und Entstaubung von Gasen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,016,864. 16p., April 9, 1970. (12 claims).*

The design for apparatus and the procedure for cooling, purifying, and removing dust from gases from oxygen steel converters, electric furnaces, and in mines are presented. The vertical axially aligned units include a gas intake hood; a moisturizing chamber; a venturi scrubber with a converging portion, a throat with a water spray, and a diverging diffuser chamber with liquid separators; blowers, a muffler; and a stack. The liquid separators may be of the baffle, centrifugal, gravity, or inertial type. The wash liquid is reused in part; the liquid with the higher solid content is returned to the moisturizing chamber, while that with the lower solid content is routed to the venturi scrubber. The liquid separated in the moisturizing chamber is reused after settling or is discarded. The mufflers may be omitted if a multiple axial blower is used, and the blower may be omitted if the waste gas outlet is connected with the gas intake hood.

20260 APTIC NO. 38804

Handman, Norman J.

PROCESS AND APPARATUS FOR REMOVING AIR POLLUTANTS FROM OVEN-STACK EMISSIONS. *(Clermont Engineering Co., Inc. U. S. Pat. 3,618,301. 3p., Nov. 9, 1971. 5 refs. (Appl. March 11, 1969, 4 claims).*

An improved apparatus is presented for removing aerosols of organic materials from hot oven gases. It comprises a spray chamber connected to the oven to receive the hot aerosols, finned cooling coils disposed within the spray chamber, and a mist eliminator communicating with the spray chamber. The hot oven gases are cooled in the spray chamber by the finned cooling coils, a separate coolant being pumped through the finned coils. The cooled aerosols are condensed as a two-phase condensate (organics- water) and fall to the bottom of the spray chamber. The finned coils are sprayed with the two-phase condensate under high pressure to increase the heat transfer efficiency between the aerosols and the cooling coils, to scrub and clean the cooling coils of any condensed tars, to clean the air stream of any dirt and dust, and to agglomerate the aerosols into droplets that fall to the bottom of the spray chamber. Any cooled aerosols remaining in the spray chamber are filtered by the mist eliminator. Prior processes have required large quantities of water and have presented problems of water storage and disposal of contaminated water.

20261 APTIC NO. 39016

Hanf, Edward B.

FUME WASHERS FOR MEDIUM AND SMALL SIZE PLATING SHOPS. *Plating, 58(12):1167-1168, Dec. 1971. 3 refs. (Presented at the American Society for Metals, All-Industry Pollution Control Workshop, 2nd, Cleveland, Ohio, June 2-3, 1971.)*

A fume washer design to remove liquid entrainment emitted during metal finishing operations, e.g., chromic acid plating, nickel plating, brass plating, and anodizing operations, is described. Typically, the shell for this air washer is constructed of glass reinforced polyester or thermoplastics, while the media is constructed of thermosplastics, since most plating solutions are acid-based and the material must resist corrosion. The washer works on the principle of interial impaction and may be adapted for use in small to medium size plating shops. It is low in cost and economical to operate.

20262 APTIC NO. 39699

Harris, T. R.

DISPOSAL OF REFINERY WASTE SULFURIC ACID. *Ind. Eng. Chem., 50(12):81A-82A, Dec. 1958.*

Sulfuric acid is used in oil refining for desulfurization, improvement of color, refining of lubricating oils, as a catalyst in alkylation, and for other miscellaneous purposes. Today, there are two proved methods for regenerating or reconstituting acids--complete combustion (sometimes known as spray-burning) and indirect decomposition. Selection of the better method for a particular application depends mainly on the composition of the waste or sludge acid. The choice may also be influenced by the value of the by-product coke, cooling water temperature, and desired plant capacity. The principal reaction in the indirect combustion method amounts to a reduction of the sulfuric acid in the sludge by the hydrocarbons present. In the spray-burning method, it has been reasoned that the sulfur dioxide formed is actually generated by reduction in the liquid droplets of sprayed material, rather than by vaporization of sulfuric acid and subsequent dissociation. Advantages and disadvantages of both methods are indicated.

20263 APTIC NO. 39299

Harstad, A. E.

CONTROL OF ODOR FROM FEATHER PROCESSING. *APCA Air Pollut. Contr. Ass.) News, vol. 4:5, March 1956.*

A feather-processing plant eliminated odors through improvements in housekeeping, cooking, and treatment of drier gases. The loading area was cleared of accumulated feathers, manure, and stray feather meal; and a sump was built to collect solids from the washdown of the area. Leaking cooker packing glands were replaced and cooker exhaust vapors were piped to a nearby pond. Drier temperatures were reduced and drier gases were directed partially up a stack with spray nozzles and partially exhausted inside the building. With this arrangement, the drier operator is able to observe the appearance of the gases and determine any changes in odor. Also, a portion of the gases are diffused with air exiting through open vents and doors.

20264 APTIC NO. 39738

Harvey, T. J. and P. C. Trounce

THE CO BOILER OF STANDARDIZED DESIGN--EFFECTIVE ANSWER TO ECONOMIC RECOVERY OF REFINERY WASTE HEAT. *Combustion, 30(2):34-39, Aug. 1958.*

For the present so-called circulating catalytic systems--fluid catalytic, Thermofor, Houdriflow--the advent of the carbon monoxide boiler has solved satisfactorily the disposal of the waste gases from the regeneration of the catalysts in modern refineries. The CO boiler from the refiner s standpoint combines the features of waste heat recovery equipment and a conventional boiler. It generates steam by burning the CO in the regenerator flue gas and recovering this heat as well as the sensible heat of the gas. This waste heat feature offers an attractive return in fuel savings. The manner in which a CO boiler fits the refinery cycle is reviewed, including design criteria, seal drums, and the bypass drum. Steam pressure control, feedwater control, combustion control, and additional instrumentation are described. Operation and maintenance are considered.

20265 APTIC NO. 38800

Hasegawa, Keiji

SHOWA-DENKO TYPE APPARATUS FOR DESULFURIZATION OF FLUE GAS. *(Showa-denko hoshiki no haien datsuryu sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 38(10):955- 960, 1971.*

A wet desulfurization process is discussed using caustic soda as the absorbing liquid. The apparatus consists of an absorbing tower to absorb sulfur dioxide, an adjusting tank to adjust the pH and the concentration of the absorbing liquid, and purifying equipment to remove impurities such as the dust from flue gas and to purify the recovered sodium sulfite. A smoke remover could also be attached to the desulfurization apparatus to remove white smoke. The operation details of the individual parts of the apparatus are described. An absorption of more than 95% of the SO2 could be achieved due to the high efficiency of gas-liquid contact in the absorbing tower. The recovered liquid contained 20% of the sodium sulfite which could be recrystallized to give a product comparable to the quality of a second grade JIS sample.

20266 APTIC NO. 38969

Hasumi, Shigeru, Takuo Minegishi, Yasuyuki Ishikawa, and Iyasu Okuyama

POLLUTION CONTROL APPARATUS FOR THE COKE FURNACE. *(Kokusu seizo sochi ni okeru gaiki osen boshi sochi). Text in Japanese. (Shinwa Trading Co., Ltd., Tokyo (Japan) and Amagasaki Coke Industries Co., Ltd. (Japan)) Japan. Pat. Sho 46-30101. 5p., Sept. 1, 1971. (Appl. April 3, 1968, 1 claim).*

By using two sets of ducts connected to a main duct and dust collectors, dusts and toxic gases created by supplying coal to the coke furnace or by pushing out the finished cokecakes from the furnace can be arrested and passed to the dust collectors. The system consists of a horizontal single coke furnace, coke exit, a guiding truck in front of the exit, an accordion hood connected with the guiding truck, a receptacle under the hood, and a duct at the top of the hood with a movable part which can be raised by a cylinder to connect with the main duct. The main duct, which is kept at negative pressure, is connected with two dust collectors. The coal supply trucks above the furnace are also connected to a duct with a movable part which can be operated by a cylinder and can be connected with the main duct. The dust and gas-bearing air is captured and sucked into the main duct, cleaned through two wet-type dust collectors, and emitted through a stack. When more than single unit coke furnaces are used, the operations of supplying coal and pushing out the completed cokecakes can be carried out simultaneously.

20267 APTIC NO. 39753

Hausberg, Gerhard and Karl-Rudolf Hegemann

RING SLOT WASHER FOR THE CLEANING OF DUST-LADEN GASES. *(Ringspaltwascher fuer die Reinigung von staubbeladenen Gasen). Text in German. (Gottfried Bischoff Bau Kompl. Gasreinigungs- und Wasserrueckkuehlanlagen KG., Essen, West Germany) W. Ger. Pat. Appl. 1,671,387. 4p., Oct. 4, 1967. 4 refs. (2 claims).*

A modified venturi gas washer with a central core that also acts as a cut-off value is presented. Tha annular solt gas washing apparatus for cleaning dust-laden stack gases comprises a venturi duct with a fitting central axially adjustable constructed so that it can rest with its preimeter against the wall of the duct. The core or the duct wall is equipped with conventional sealing elements. The advantage of the system is that a separate cut-off value is not required.

20268 APTIC NO. 38899

Hayashi, Seiichi, Takatoshi Ikeda, and Kunitoshi Ohashi

CYCLONE TYPE DUST COLLECTOR. *(Saikuron shiki shujinki). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-3955. 4p., Feb. 3, 1972. (Appl. Sept. 5, 1969, 3 claims).*

A dust collector is installed in the basement of a building and has pipelines connecting it to the rooms of the building. A brush type cleaner is connected to the end of pipeline for each room, so that dust and trash may be sucked into the dust collector through the pipeline as the cleaning of each room is performed. The new dust collector features the double-cyclone structure, the primary cyclone separating large-sized dust, and the secondary separating finer dust. It is designed so that the assembling and disassembling is very easy. It comes in a cylindrical shape, the upper half being the cyclone section and the lower half the dust retainer section.

20269 APTIC NO. 39624

Haynes, C. D.

ATMOSPHERIC POLLUTION FROM PETROL ENGINES. CONTROL OF OXIDES OF NITROGEN BY EXHAUST RECIRCULATION. *Motor Industry Research Association, Nuneaton (England), MIRA Rept. 1969/12, 18p., May 1969. 6 refs.*

Recirculation of exhaust gas to reduce peak combustion temperatures and thus control nitrogen oxides emissions was applied to a typical European 1725 cu cm engine fitted to an automatic transmission vehicle. The engine had a manufacturer-installed emissions control system for carbon monoxide and hydrocarbons. Initial tests under constant speed conditions showed how the reduction of nitric oxide varied with the percentage of exhaust recirculated. From these results a manually controlled recirculation system was made to allow tests under U. S. Federal cycle conditions, and finally an automatic control system was developed which recycles the gas so that it enters the induction system upstream of the main-throttle butterfly. A damping chamber in the pipework reduces pressure pulsation effects, while a rapid-acting cam cuts off the recirculation at idle and full throttle. With about 16% recirculation, the oxides of nitrogen are reduced by about 80% and the emissions of NO, CO, and HC are then all within the proposed 1974 California limits. Fuel consumption, driveability, and cold starting are not impaired significantly, but no durability data were obtained. The technique should be applicable to other small engines but success depends on having a sufficiently high power-to-weight ratio so that maximum engine power is not used in the cycle. Additional tests were made on other factors which affect NO, such as ignition timing, exhaust back-pressure, and cylinder-head material. The first of these was the most effective, and on a higher performance version of the test car, NO emissions were reduced to about the proposed 1972 limits merely by disconnecting the vacuum-advance unit. (Author summary modified)

20270 APTIC NO. 39255

Hemeon, Wesley C. L.

AIR POLLUTION PROBLEMS OF THE STEEL INDUSTRY TECHNICAL COORDINATING COMMITTEE T-6 STEEL REPORT. DUST PROBLEMS IN BLAST FURNACE OPERATION. *J. Air Pollution Control Assoc., 7(1):62-67, May 1957. 11 refs.*

The blast furnace process and apparatus, including the hearth, bosh, stack, dustcatcher, primary and secondary cleaners, iron ladles, cinder ladles, double bell, and offtakes, are described. Two potential types of dust emission are the residual dust in blast furnace gas which passes to the atmosphere with the flue gases and the occasional escape of dust-laden gas from the bleeder openings of the furnace. Blast furnace gas cleaning is usually effected in two stages: removal of 90% of the dust, including the coarse fraction, in a primary water scrubber, and secondary washers or precipitators for fine-cleaning. The washing of coal before charging to the coke ovens to reduce ash and sulfur content is becoming common. The reduction in ash content results in a lesser contribution of slag constituents from this source and has beneficial effects on blast furnace operation. Sintering the fines which are separated from the raw ore by screening is also having beneficial effects on blast furnace operation and slipping frequency. Another practice for reducing air pollution involves arrangements for venting gas pressures due to slips by opening a bleeder communicating directly with the clean side of the gas washer.

20271 APTIC NO. 38863

Herman, E.

APPLICATION OF THE DRYFLO-FLUIDIZED BED METHOD FOR THE RECOVERY OF COPPER CABLE SCRAP. *(Anwendung des Dryflo-Wirbelbettverfahrens zur Zerlegung von Kupferkabel-Schrott). Text in German. Z. Erzbergbau Matallhuettenwesen, 24(12):584-587, Dec. 1971. (Presented at the Huettenausschusses fuer Kupfer gemeinsam mit dem Unterausschuss fuer die Wieterverarbeitung von Kupfer, Cologne, West German, June 1971.)*

The copper in cables from the motor and electronic industry, household cables, and doorbell wire is usually recovered by burning the insulation. The smoke and waste gases which develop at the process are undesirable because they pollute the environment. The gases can be cleaned in a scrubber which makes the recovery costly and rather complicated. A system for mechanical separation was found. The cable is first granulated and then passed to a frame with a length of 75 cm and a width of 25 cm which narrows to 2.5 cm. The air-tight frame accommodates a porous bed of plastic through which air is blown at a low pressure into the frame. The frame is mounted on an inclined plane. The granulated cable parts hover above the air cushion towards the narrow end of the frame. At the end of the frame two separation plates are used for separation of the heavy copper parts, the medium heavy ones and the plastic material. For better separation, pulverized iron is mixed with the granulated cables.

20272 APTIC NO. 39592

Herzog, A.

NOTE ON DUSTING TOWERS. *(Note sur les tours de depoussierage). Text in French. Tech. Sci. Munic., 66(11):413-413, Nov. 1971. 1 ref.*

Two funnel-shaped structures, 5 m tall and 1.6 m in diameter, were erected in Paris to absorb and purify dust particles and other atmospheric pollutants in the air. The towers contain filters and are powered by 2.5 horsepower engines. They also contain sensing and monitoring devices that record pollution levels in the vicinities they serve.

20273 APTIC NO. 39132

Heuvel, H. M. J. van den

DEVELOPMENT AND EFFECT OF FUEL INHIBITORS. *(Entwicklung und Wirkung von Brennstoffinhibitoren). Text in German. Freiberger Forschungsh. A, no. 503:51-67, 1972.*

The addition of metal containing combustion catalysts to the fuel reduces the soot quantity produced. The additive also reduces concentration of the polycyclic hydrocarbons. Studies have led to the assumption that the soot-reducing influence of the alkali metals added to the flame is due to adherence of metal ions to the developing soot particles which prevents agglomeration. The soot particles whose agglomeration has been prevented are again burned. The addition of additives also prevents the development of aggressive sulfur compounds. During the combustion of sulfur, free oxygen plays an important role in the formation of sulfuric acid. With an increase of the oxygen concentration, the amount of sulfur trioxide in the flue gas increases immediately. With the presence of 1% free oxygen in the flue gas, the sulfur trioxide concentration may rise to more than 35 ppm. The oxidation of SO2 to SO3 is primarily caused by atomic oxygen. In an efficient additive, special inhibitors are present which have a higher affinity for atomic oxygen than SO2. Apart from the use of additives in steam boilers, they can also be used in diesel engines and in steel and glass melting furnaces. The injection of liquid additives into natural gas or coke oven gas-fired furnaces is also used since these gases contain sulfur. For coal-fired furnaces, pulverized additives have been developed. At today s prices, the use of additives on the average amounts to 1 to 2% of the price for heavy fuel oil.

20274 APTIC NO. 39663

Hill, George R.

THE PLACE OF TALL STACKS IN AIR POLLUTION CONTROL. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc., U. S. Tech. Conf. Washington, D. C., 1950, p. 408-414. 14 refs. (May 3-5, Louis C. McCabe, ed.)*

The smoke stack in industry serves two purposes, that of supplying natural draft and that of conveying the smoke away from the stack. Too often height is determined by the former use, with too little thought to the latter function. The theory of smoke dispersion from chimney is discussed. Each problem needs to be studied locally before location or stack height can be determined. While the stack effluents may be very similar, topography, wind direction, velocity, turbulence, and other meteorological factors may be widely different, even in locations in fairly close proximity to each other.

20275 APTIC NO. 39115

Hirai, Masuhiko, Robert Odello, and Haruo Shimamura

SOLVENT/CATALYST MIXTURE DESULFURIZES CLAUS TAILGAS. *Chem. Eng., 79(8):78-79, April 17, 1972.*

A process for the removal of sulfur compounds from tail gases from Claus units is examined with respect to process economics, processing, and recovery. The key to the process is the use of a liquid solvent with dissolved catalyst that passes countercurrently against the tail gas. The catalyst has a high selectivity; both the solvent and catalyst have good thermal stability and allow intimate contact with the tail gas without undue frothing. The counterflow absorber reduces sulfur dioxide and hydrogen sulfide emissions to the 2000-3000 ppm range. The recovered sulfur is of good quality, and mild steel can be used in construction throughout the plant.

20276 APTIC NO. 38945

Hodgson, Allan S.

THE ELIMINATION OF ODOUR FROM THE EFFLUENT GASES OF CHICKEN MANURE DRYING

PLANT. J. Agr. Eng. Res., 16(4):387-393, Dec. 1971. 1 ref.

Experiments were performed to determine the cause of the odor and possible means of its removal from the waste gas of a chicken manure drying plant. Although odor removal is possible, the cost is high and the problem should ideally be considered during the plant design stage. The odor is caused by ammonium salts of carboxylic acids, free acids, and neutral material. A scrubber installed to remove the odor is not sufficient as the water in the scrubber becomes saturated with soluble components. Improvements may be obtained by installing a filter to remove solids and to lower scrubber load, together with increased freshwater input. Sodium hydroxide scrubbing is superior to water scrubbing, but the expenditure of providing a second tower is required. Activated charcoal will remove the smell but at a high cost. The drying of chicken manure must be accomplished in a system which does not produce gaseous effluent with strong odor. (Author abstract modified)

20277 APTIC NO. 39370

Hoepke, C. -H.

CATALYTIC DELAYED COMBUSTION OF AFFLUENT AIR FROM DRYERS IN THE CORN STARCH INDUSTRY. *(Katalytische Nachverbrennung von Abluft aus Trocknern der Maisstaerkeindustrie). Text in German. Staerke, 23(12):444-447, 1971. 3 refs. (Presented at the Staerke-Tagung der Arbeitsgemeinschaft Getreideforschung, 22nd, Detmold, West Germany.)*

In connection with anti-air pollution measures, a pilot plant for deodorization steam saturated vapors from corn starch food driers is described. The vapor saturated waste air is heated from approximately 80 C to 440 C by means of natural gas. Passage over tubular silica honeycomb catalysts containing 0.1% platinum converts the odor carriers to carbon dioxide and water. The operation has a conversion of more than 95% and is more economical if the hot odor-free gases from the converter are used for drying other products.

20278 APTIC NO. 39613

Horsley, Michael E.

COMBUSTION CONTROL. AN AID TO POLLUTION PREVENTION. *Ind. Process Heat., 1970:38-39, Nov. 1970.*

Burner system design, matching, and maintenance as parameters to examine the aspects of the relationship between efficient combustion control and air pollution are reviewed. For efficient combustion, fuel and air must be in the correct proportions; they must mix intimately; they must meet under the proper ambient conditions; and they must have sufficient time to react completely. Proportions and mixing are a function of burner design. A good design, however, is not enough; the combustion zone must provide the proper time and environment, and continued good combustion is necessarily dependent upon regular maintenance.

20279 APTIC NO. 39078

Hoshizawa, Kinji and Seisuke Suzuki

DUST REMOVAL. *(Shujin). Text in Japanese. Karyoku Hatsuden (Thermoelectric Power Generation), 23(3):296-312, March 1972. 12 refs.*

Mechanism and performance characteristics of various dust collectors, were discussed. Theoretical calculation formulas established to estimate their various performance factors were also presented. Types of dust collector taken up for the discussion included the mechanical dust collector (such as centrifugal-types), electric dust collector (electric precipitation-type), filtration dust collector, and scrubbers. Dust collectors installed in the nation s thermal power plants were broken down by type. Various factors affecting the performance of a dust collector in a thermal power plant were analyzed: Grain-size distribution of dust from the powdered coal boiler measured at the intake port of a dust collector was charted, the average grain size being about 30-40 micron. Dust from the heavy oil boiler is less in quantity and finer in grain size, those of 5 micron or smaller accounting for about 90%. How grain size of the dust affects either a mechanical or electrical type dust collector was shown in the charts and diagrams. Constituents of dust from both the powdered coal and heavy oil boilers were tabulated. Specific electric resistance of dust is known to affect the performance of an electric dust collector. Dust giving the specific resistance of 10,000 10 billion ohm/cm is best-suited for an electric dust collector. The relation between the effect of sulfur trioxide on apparent specific resistance of fly ash and the temperature of gas is fully discussed with the reference tables and charts. The main problems involving the mechanical dust collector include clogging of the cyclone and vane entrances and corrosion/abrasion of vane and tubes, while those for an electric dust collector are the breaking of discharge lines, ash deposited on dust collector plates and scattering of arrested dust. Measures for improved performance of dust collectors in a thermal power plant were listed.

20280 APTIC NO. 39654

Houdry, Eugene J.

WORLD S BIGGEST CLEANING JOB. *J. Franklin Inst., 258(3):175-185, Sept. 1954. (Presented at the Franklin Institute, Science is Fun Lecture, Philadelphia, Pa., May 12, 1954.)*

The use of catalysts and other developments for air pollution control were discussed. The Oxycat is the first oxidation catalyst to be developed. It is composed of two porcelain end plates which hold 71 porcelain rods in place. The rods are coated with a catalyst composed of platinum and aluminum. Catalytic reaction occurs when the combustible gases come in contact with the catalyst. The first use of the Oxycat was in conjunction with gasoline engines for the elimination of carbon monoxide and hydrocarbons. The Oxycat can also be applied to eliminate fumes and objectionable odors from industrial processes. Installations are usually made in the exhaust stack of the industrial process. Applications include the petroleum industry, incinerators, food processing, and industrial drying ovens and furnaces. For home use another type of catalyst was developed which consists of a resistance wire coated with a platinum catalyst. The catalyst has the ability to function at low temperatures. It elimnates cigarette smoke, undesirable odors from cooking, pollen, and bacteria. It can also be applied to a gas-fired house- incinerator.

20281 APTIC NO. 38753

Huang, Yun-yang

ADSORPTION OF CARBON MONOXIDE, NITROGEN, AND KRYPTON ON ULTRASTABLE ZEOLITE. *J. Catalysis, 24(1):183-185, Jan. 1972. 4 refs.*

The adsorption of carbon monoxide, nitrogen, and krypton by an ultrastable Y zeolite (0.2-0.3% sodium oxide and a silica/aluminum oxide ratio of 5.4) was measured at 0-145 C and 5-300 torr. Adsorption isotherms were all linear on the sample evacuated at 350 C except in the case of CO where a slight concavity toward the pressure axis was observed below 25 C. When the sample was evacuated at 800 C, the adsorption was practically unchanged for Kr, slightly increased for N2, and greatly increased (at least 50%) for CO. The adsorption isotherms of CO were concave below 50 torr. The isoteric heats of adsorption were virtually independent of surface coverage; for the sample evacuated at 350 C they were 3.4, 3.8, and 4.3 kcal/mole for Kr, N2, and Co, respectively. After evacuation at 800 C, the heat of CO adsorption increased to 6.4 kcal, but that of N2 increased only slightly and the heat of Kr adsorption remained almost unchanged. The specific adsorption sites observed on an amorphous silica-alumina cracked catalyst were not present on the crystalline material, which has a wide range of intermediate energetic sites. The increase in CO adsorption following evacuation at 800 C suggests a minor contribution by electrostatic interaction, most likely by a quadrupole force.

20282 APTIC NO. 39301

Hughes, W. H.

NEW TECHNIQUES OFFER EFFICIENT ODOR CONTROL. *Food Eng., vol. 33:82-84, July 1961.*

A redwood scrubbing tower with low-pressure sprays cuts the odor level of fish-meal processing gases by moe than 99%. The tower uses chemical-treated seawater and costs only a few cents a day to operate. Other feasible odor control techniques for meat-packing and fish-processing plants are scrubbing with water, scrubbing with acids, incineration, and electrical precipitation. Incineration has low capital costs, but very high operating costs ($80/day). Precipitation has very high capital cost, but negligible operating costs. The former would be suitable only for a dryer operated a few hours a week to dispose of hard-to handle scrap. The latter would be suitable only for continuous operation in an area where limited water is available for scrubbing.

20283 APTIC NO. 38767

Igonin, P. G., A. A. Kolozhvari, V. V. Svitkin, Kh. A. Iriskhanov, S. M. Smereka, V. K. Gofman, K. A. Zakutin, and I. T. Lavrinenko

REDUCING AIR CONSUMPTION IN THE OXIDATION OF PARAFFIN. *(Umen sheniye raskhodov vozdukha pri okislenii parafina). Text in Russian. Nefteperarab. Neftekhim., 9(38):37-38, 1971. 3 refs.*

In the oxidation of paraffin wax to synthetic fatty acids over manganese dioxide at 110 C, air consumption was reduced by more than 30% by increasing the oxidation column height from 12.0 to 16.9 m and slightly increasing the diameter. This was accomplished without changing the linear air velocity of 0.093 0.098 m/sec or in the reaction time of 18 hr. The results included a reduction of air pollution, a 30-32% by wt content of acid in the oxidate, and a 30% reduction of the load on the condenser collector system. The 55 tons of feed, containing wax and unsaponifiables in a 1:2 ratio, were oxidized over 0.1% by wt of catalyst. Air consumption was reduced from 60 to 38-40 cu m/hr/ton of feed.

20284 APTIC NO. 39333

Iida, T., C. H. Ruof, N. V. Messina, H. J. Gibson, R. A. Sholts, J. Ikeda, H. Minamiya, T. Mori, S. Jo, N. Yamaki, H. Katayama, M. W. Munsell, J. H. Blakney, L. E. Coleman, M. T. White, Jr., T. Niskihara, N. Watanabe, T. Saito, T. Sakurai, R. Hirokawa, and M. Ishimaru

FUEL OIL AND LUBRICANT IN AUTOMOTIVE EXHAUST EMISSION CONTROL. *(Jidosha no haiki kogai boshi taisaku to nenryo, junkatsuyu). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 15(4):2-7, April 1972.*

The minutes of a round-table talk on automotive exhaust emission control are presented. The talk included discussion on the proposed classifications of crankcase oil and gear oil. Evaluation of gasoline requirements should include appraisal of antiknock performance, exhaust emission control system compatibility, introduction system cleanliness, and driveability performance. The antiknock index suggested as representative of the antiknock performance is obtained by subtracting Motor Octane Value from the Research Octane Value and then dividing the balance by 2. Correlation between exhaust gas control devices, (such as catalyst converters and thermal reactors) and lead content and composition of gasoline is still under review. An evaluation method on the cleanliness of the carburetor, intake manifold, and intake valve is yet to be developed. Volatility of the gasoline has something to do with the driveability performance. Poisoning of the muffler catalyst caused by leaded gasoline was also discussed. The present criterion of 0.07 g/gal lead content for the poisoning might result even with 0.02 g/gal. Effects of the lead content of gasoline and the ash content of lubricants on the octane requirement increase (ORI) was also discussed. In a CRC test, ORI was 2.3 with leaded gasoline and 2.0 with the unleaded. Tested with the oil containing 1 wt% ash content and with that containing no ash, ORI was about the same. Other topics included unleaded of gasoline, cleanliness of engine, exhaust gas control devices, temperature of engine oil, and effect of the lubricant s ash content on abrasion of the exhaust valve.

20285 APTIC NO. 38720

Ito, Tadayoshi

STEAM JET CONDENSATION TYPE SOUND WAVE DUST COLLECTION DEVICE. *(Joki funshashiki gyoshukugata onpa shujin sochi). Text in Japanese. (Kawasaki Heavy Industries, Co., Ltd., Kobe (Japan)) Japan. Pat. Sho 46-30078. 3p., Sept. 1, 1971. (Appl. Aug. 31, 1968, 1 claim).*

The invention utilizes sound waves or ultrasonic waves for condensation of dust around atomized steam. A noise-producing device such as the Haltmann whistle is used for creating a sound wave or ultrasonic wave; coagulation of dust particles and jet steam mist is assisted by the kinetic energy of the wave. The atomized mist created by the ultrasonic wave will help prevent evaporation of the steam. Water for spray is supplied from a tube at the end of which is a resonator with small openings. A circular nozzle surrounds the tube through which high pressure steam is supplied and jet-sprayed, creating a strong ultrasonic wave. The sound wave will collide with the soundboard surrounding the nozzle and will be directed toward the axial line where it will collide with the jet-sprayed water to create mist. The dust- bearing gas is supplied from the gaps between the nozzle and the soundboards and from the holes on the soundboard.

20286 APTIC NO. 39093

Javorsky, B. S.

GAS CLEANING WITH THE FOAM SCRUBBER. *Filtration Separation (Purley), 9(2):173-175, March/April 1972. (Presented at thd Filtration Society Conference on Filtration in Process Design and Development, London, England, Sept. 28-30, 1971.)*

A foam scrubber design within the wet collector category but requiring very small quantities of liquid and operating at extremely small pressure drops is presented. The basic features of the Centrifoam scrubber for gas cleaning are a modification of an earlier system. The scrubber consists in the main of a vertically arranged cylindro-conical vessel with an inlet and distribution facilities for the dust-contaminated gas at the bottom, which is also fitted with a paraxial sludge outlet. The greater part of the vessel is filled with a foam bed which is supplied continuously or at predetermined intervals from a foam inlet in the cylindrical part of the vessel. The gas is cleaned in a counter-current stream of foam and gas; cleaning efficiency is almost independent of dust particle size. Pressure requirements are exceptionally low and the sludge has a high content of dry solids, thus minimizing water pollution problems. Scrubber design and operation, foam preparation, and field of application are examined.

20287 APTIC NO. 39696

Johnstone, H. F.

NEW ENGINEERING DEVELOPMENTS IN THE CONTROL OF AIR POLLUTION. *Chem. Can., 4(10):25-30, Oct. 1952. 10 refs.*

Two examples of current development in air pollution control are described. One of these is the contribution of several branches of science to the identification and tracing to their origin of the principal contaminants in the Los Angeles smog.

This led to the control of hydrocarbon losses at the sources, which is expected to improve the visibility and decrease the number of complaints about eye irritation and plant damage. The second example is the fundamental research underlying the engineering development of the venturi scrubber. Theoretical and experimental studies indicate that, except for the very smallest aerosol particles, the principal mechanism of collection is the inertial impaction of the particles on the surface of water droplets during and immediately after the atomization takes place. High collection efficiencies of dust, smokes, oil fumes, sulfuric acid mists, and other air pollutants from industrial operations are now being attained with this scrubber. (Author summary modified)

20288 APTIC NO. 38872

Juentgen, Harald and Karl Knoblauch

DESULFURIZATION OF WASTE GASES FROM COAL AND OIL FIRED POWER PLANTS. *(Entschwefelung von Abgasen aus Kohle- und Oelkraftwerken). Text in German. Erdoel Kohle (Hamburg), 24(12):738-743, Dec. 1971. 10 refs.*

The sulfur dioxide emissions from thermal power plants can be reduced by desulfurization of either the fuel or the waste gas. Although the sulfur is present in the fuel at much higher concentrations (1 to 3% by weight) than in the waste gas (0.06 to 0.2% by volume), it is very questionable at the moment whether fuel desulfurization is more economic than a waste gas desulfurization. In the case of hard coal, for instance, the organic sulfur cannot be removed without major changes of the coal properties (by pyrolysis). Pyrite, which amounts to 1/3 of the sulfur present in the fuel, can be rather efficiently removed at a cost of 40 cents/ton of coal. With the additive method for waste gas desulfurization, about 35% of the sulfur can be removed. The method is based on the injection of lime or dolomite behind the burner. At a stoichiometric quotient of one and a temperature of 500 C, a desulfurization of 25% is achieved and at 900 C, 35%. The costs are given to run a 500 MW power plant fired with coal containing 2.5% sulfur annd possessing a heating value of 5000 kcal/kg. For achievement of a higher degrees of desulfurization a method has been developed which is based on the retention of SO2 on activated coke made from hard coal. The activated coke reactor follows the electrostatic precipitator or the cyclone. The desulfurization efficiency for a 500 MW power plant fired with hard coal with a heating value of 7000 kcal/kg and a sulfur content of 1.5% is 80%. The costs with thermal recovery will come to 0.3 cents/kWh (8000 operating hrs).

20289 APTIC NO. 38825

Kaiser, Ulrich

THERMAL AND CATALYTIC AFTERBURNING AND INFLUENCING OF THE COSTS. *(Thermische und katalytische Nachverbrennungsanlagen und die Beeinflussung ihrer Wirtschaftlichkeit). Text in German. Energie Tech., 24(1):8-12, Jan. 1972. 3 refs.*

Thermal afterburning with open flame in a non-cooled combustion chamber is a safe and universal method for cleaning waste air. A rapid and complete mixing of the waste air with the hot flame whose temperature commonly lies between 750 and 900 C is important. In thermal afterburners with a throughput of 10,000 cu m waste air/ hr, the average residence time reaches 1.5 to 2 sec; in small afterburners with throughputs up to 1000 cu m/hr, the residence time is less than 1 sec. After oxidation of the toxic or odorous pollutants, the air leaves the chamber with a temperature of 750 to 900 C. This heat can be used in the process. Catalytic afterburning takes place at temperatures between 300 and 500 C. The catalysts for the oxidation of pollutants consist of metallic or ceramic carriers with large pore volumes, over which the catalytically active components such as platinum, palladium, or metal oxides are finely distributed. Frequently, granulated catalysts are used. They consist of cylindrical grains with a diameter of 4 mm. They are distributed over a bottom of wire mesh with a thickness of 60 to 100 mm and have a somewhat higher pressure loss (50 to 100 mm water) than the rod-shaped catalysts. The reaction on catalysts is exothermal. The temperature rise of the waste air through catalytic oxidation corresponds to the sum of the combustible components in the waste air. The costs of afterburning depend on the preheating temperature of the waste gas prior to entry into the combustion chamber. The cost minimum is found at a temperature level in the preheater which still permits the use of non-alloyed material.

20290 APTIC NO. 39677

Katz, Jacob

ELECTROSTATIC PRECIPITATOR PRIMER. *Iron Steel Engr., 41(5):124- 130, May 1964. 12 refs.*

The three basic parts of any electrostatic precipitator installation are power supply, collection area, and dust removal area. Theoretical dust collection fundamentals, preciptator power, applied voltage frequency and waveform, spark-over characteristics, electrode characteristics, gas flow rate and distribution, dust concentration, particle size and resistivity, temperature, pressure, humidity, and dust removal from collection plates are considered. Field experience has shown that if each application is studied in relation to these basic principles, the desired efficiency can be obtained. How these factors are modified by operating conditions is also considered. The steel industry uses precipitation primarily to clean waste gases in order to avoid atmospheric pollution or remove suspended solids so the gases can be utilized as fuels or for by-product recovery processes.

20291 APTIC NO. 39532

Kay, Frank L.

POLLUTION SOLUTION FOR FOOD PROCESSORS. *Ind. Wastes, 4(2):21-22, March 1959.*

A plant manufacturing chicken liver paste solved its odor problem with a catalytic oxidation system that burns onion odors and chicken fat vapors to an odorless, invisible product composed mainly of carbon dioxide and water. The oxidation catalyst is a small porcelain unit consisting of 71 rods coated with a platinum and alumina alloy and supported between two porcelain end plates. Two hundred units are installed in a combustion chamber located under the roof-top exhaust blower. The catalyst is normally operated at 800 F to insure complete clean-up; preheat is accomplished by a gas burner. Estimated fuel costs to run the air pollution control system are less than $4.00/day.

20292 APTIC NO. 39237

Keith, Larry W.

J. F. QUEENY PLANT S AIR POLLUTION ABATEMENT PROGRAM. *Missouri Univ., Columbia, Coll. of Engineering and Missouri Air Conservation Commission, Jefferson City, Control Dusts, Smokes, Noxious Odors, Proc. Annu. Air Pollut. Conf., 3rd, Columbia, Mo., 1970, p. J1-J11. (Nov. 17.)*

At a large chemical plant with numerous products and pollution sources, any employee or private citizen can register a complaint with pollution control group. Each complaint is investigated by a group member and logged for future reference. Equipment installed as a result of the control program includes an oleum fume scrubber, a maleic scrubber, and a sandblasting shop dust collector. An a three-phase vent survey program, vents having a high pollution potential were measured and analyzed and a phthalyl chloride fume scrubber, cyclone dust collector, and acetic acid afterscrubber were installed. In addition to the plant deodorization program, there is an active boiler stack gas emission program that calls for converting four of the five boilers to gas by the end of 1972. In 1969 every operator and foreman in the plant was trained in pollution control. Articles on pollution are frequently printed in the daily plant newspaper. Every new project or any process change must be approved by the pollution control group. Program costs exceeded $3 million between 1965 and 1969, from 1970 to 1974 an estimated $10 million will be spent in continuing pollution control.

20293 APTIC NO. 39003

Kido, Saneo

MUFFLER THAT ALSO SERVES AS AN EXHAUST GAS CLEANER. *(Haiki gasu no joka omo naseru mafura). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-5013. 2p., Feb. 12, 1972. (Appl. June 25, 1969, 1 claim).*

A muffler combined with a built-in scrubber type gas cleaner is described. The main casing of this muffler-cleaner is a tube having semi-conic covers fitted to both ends, one to the front and the other to the rear. At the top of the front cone is the intake port connected to the exhaust pipe from the engine while the discharge port of the muffler is at the top of the rear cone. Installed along the horizontal axis of the main casing is a specially designed water pipe whose top part enters the front cone through the silencer plate partitioning the front cone from the main tube and is provided with stirrer blades. The water pipe is provided with a number of small holes. As the exhaust gas is taken through the intake port into the front cone, the stirrer blades are driven by the exhaust gas, thus turning the entire water pipe. The gas is thus stirred and moves into the space formed between the water pipe and the inner tube. Since the water pipe is not turning, water splashes out through the small holes to scrub the exhaust gas flowing toward the discharge port. The scrubbing water is then collected in the space between the inner tube and the main casing where it is stirred by the blades of the inner tube and centrifugally cleaned. The cleaned water is then circulated into the water pipe through the circulation pipe while the dust and particles removed are taken out through the dust removal port of the main casing.

20294 APTIC NO. 39750

King, R. A.

ECONOMIC UTILIZATION OF SULFUR DIOXIDE FROM METALLURGICAL GASES. *Ind. Eng. Chem., 42(11):2241-2248, Nov. 1950. 12 refs.*

The conditons regarding the dispersion of smelter smoke at Trail are outlined, and the development of the various sulfur recovery processes employed is traced. The smelter is located in a mountainous area where topographical and meteorlogical conditions are unfavorable for adequate dispersion of the sulfur dioxide contained in metallurgical waste gases. Expansion of the smelter output in the 1920 s resulted in some atmospheric pollution, and proximity to the United States border caused international complications. Many of the developments were based on integration of new plants with existing ones and utilization of by-product materials from established operations. The availability of ammonia made possible its use as an absorbent for sulfur dioxide. The acidification process for releasing sulfur dioxide from the absorbing solution was practical because a supply of sulfuric acid was at hand and the company was already producing and marketing ammonium sulfate. By-product oxygen made possible operation of the sulfur dioxide reduction process. At present all roaster and sintering plant gas is treated for sulfur recovery, and iron concentrate is roasted intermittently, depending on the demand for acid and the availability of custom zinc concentrates. Total current loss to the atmosphere is less than 9% of the sulfur charged.

20295 APTIC NO. 39047

Klyamer, S. D., I. L. Leites, V. I. Murzin, Yu. A. Rodin, and Zh. A. Bril

EFFECTIVENESS OF DIETHANOLAMINE IN PURIFICATION OF GASES FROM CARBON DIOXIDE. *(Effektivnost ispolzovaniya dietanolamina pri ochistke gazov ot dvuokisi ugleroda). Text in Russian. Khim. Prom. (Moscow), no. 1:41-42, 1972. 6 refs.*

The heat expenditure during the removal of carbon dioxide from gases by means of aqueous monoethanolamine and diethanolamine solutions was studied under optimum regeneration conditions for each of the two absorbents. A laboratory desorber with five plates was utilized varying the ethanolamine concentrations from 1.0 to 2.5 moles/l reaching a degree of carbonatation of 0.35-0.40 CO2/mole ethanolamine upon CO2 absorbtion. Minimum heat expenditure for the regeneration of each of the absorbents appeared to be 1.1-1.6 times the calculated figure, this latter corresponding to an infinite contact surface within the desorber. Both calculated and experimental heat expanditures for the regeneration of diethanolamine constituted 50-70% of the corresponding value for methanolamine, indicating that utilization of diethanolamine for the removal of CO2 from gases is more convenient.

20296 APTIC NO. 38727

Kniprath, Elmar and Wilhelm Goralczyk

PROCEDURE FOR THE OXIDATION OF ARSENIC. *(Verfahren zur Oxydation von Arsenik). Text in German. (Norddeutsche Affinerie, Hamburg (West Germany)) W. Ger. Pat. Appl. 2,020,308. 8p., April 25, 1970. (2 claims).*

A process for the oxidation of arsenic to recover arsenic acid from the dust in flue gases emitted by a nonferrous metal foundry is presented. Previous methods for the oxidation of arsenic used strong oxidizing agents, primarily nitric acid, which caused heavy corrosion. The regeneration of the nitrose-containing waste gas was also a problem. Based on the present process, 4 l of slurry from the washing of converter waste gases of the foundry containing 126 g/l arsenic, 24.4 g/l lead, 18.35 g/l copper, 1.8 g/l antimony, 3.0 g/l tin, 20.0 g/l selenium, 52.0 g/l sulfates and sulfides, 650.0 g/l sulfuric acid, 65.0 g iron, and 0.7 g hydrogen chloride was stirred for 2 hr at 130 deg and 10 atm to give a solution containing 492.4 g of arsenic at 99% conversion to arsenic acid, 64.0 g copper, 222.1 g iron, 2800 g sulfuric acid, and 1054 g of a residue containing 10.5 g arsenic, 6.3 g copper, and 51.6 g iron. The sulfuric acid contained iron, chlorine, and copper arsenide and/or copper antimonide as reaction promoters.

20297 APTIC NO. 39330

Koberstein, Edgar and Eduard Lakatos

OXIDATION CATALYSTS FOR USE AT HIGH TEMPERATURE, ESPECIALLY FOR PURIFYING EXHAUST GASES FROM COMBUSTION ENGINES AND INDUSTRIAL PLANTS. *(Herstellung eines Oxydationskatalysators zur Verwendung bei erhoehter Temperatur, insbesondere fuer Reinigung von Abgasen aus Verbrennungsmotoren und Industrieanlagen). Text in German. (Deutsche Gold- und Silber-Scheideanstalt, Frankfurt (West Germany)) W. Ger. Pat. Appl. 2,018,378. 17p., April 17, 1970. (8 claims).*

A process for the preparation of oxidation catalysts for use at high temperatures, with special adaptation for purifying exhaust gases from combustion engines and industrial plants, is presented. An aqueous solution of ammonium chromate, copper nitrate, and barium nitrate is precipitated with ammonium hydroxide, and the barium-doped copper chromate is dried for 10 hr at 120-130 C, heated for one hour at 350-400 C in a muffle furnace, and is milled to 60 micron granulation. Then 16 kg of the precipitate and 100 kg alumina press cake are homogenized in a pug mill for 3 hr, and the dried product is milled to 100 micron granulation and pug milled with 54 ml nitric acid and 60 g stearic acid in 580 ml of water. The pasty mass is extruded, dried for 18 hr at 120 C, for 2 hr in air with the temperature gradually increasing to 500 C, and for 2 hr in a muffle furnace at 500 C, is mixed thoroughly with 3 l of aqueous nickel nitrate, is dried again at 120 C, precalcined in air at 450 C, and calcined for 2 hr at 800 C in a muffle furnace. The final products are gamma and n-aluminum oxide catalysts containing over 50% by weight of chromium, copper, and nickel oxides.

20298 APTIC NO. 39334

Kodera, Yoshihide, Jun Kato, Tetsu Oshima, Yasunori Kuriki, Kazuo Shimada, Morio Suzuki, and Hidetake Ose

CONTACT HYDROGENATION TREATMENT OF HYDROCARBON OIL. *(Tankasuisoyu no sessboku suisoka hoho). Text in Japanese. (Ministry of International Trade and Industry (Japan), Agency of Industrial Science and Technology) Japan. Pat. Sho 47-4627. 7p., Feb. 8, 1972. (Appl. Feb. 14, 1969, 1 claim).*

A fluidized bed catalyst-using hydrogenation reactor column was designed for the hydrogenation, hydrogenolysis, or hydrodesulfurization of residual fuel oils containing such impurities as asphaltene and sulfur. Whether using a fixed-bed type or a fluid-bed type catalyst, a conventional reactor of this kind has operational disadvantages including the complete halt of operation for replacement of used catalyst or the waste of catalyst resulting from the replacement process. Operational disadvantages posed by the conventional system can be eliminated by holding the feed-in velocity of the oil-hydrogen mixture at a speed such that the catalyst packed in the column stays floating in one position, forming a static bed of the catalyst as a whole. With the catalyst held in this position, the reactor gave a desulfurization of 78.3%, compared with about 79.0% obtained when the catalyst was violently moving. In addition to this static bed arrangement, the new reactor incorporates unique device to permit easy yet effective replacement of the old catalyst with fresh while continuing the hydrodesulfurization process. The device consists of a small blow-in pipe installed vertically in the bottom of the reactor and a hook-shaped pipe of larger size installed in the reactor's bottom so that the mouth of it may be directly above that of the blow-in pipe. Both pipes are connected, via valves and pump, to the catalyst separator box provided outside reactor column. The distance between the mouths of the two pipes is adjustable. New catalyst grains are fed in from above the reactor column. The catalyst is granualar and made of molybdenum, cobalt, nickel, tungsten, or iron or two or more of these elements.

20299 APTIC NO. 39235

Koehler, R.

CUPOLA DUST REMOVAL WITH REGARD TO THE NEWEST EXPERIENCES AND LEGAL REGULATIONS. *(Kupolofenentstaubung unter Beruecksichtigung der neuesten Erkenntnisse und gesetzlichen Bestimmungen). Text in German. Giessereipraxis, no. 13:254-258, July 10, 1968.*

While hot air blast cupola ovens generate from 2 to 20 kg dust and cold air blast ovens 2 to 12 kg dust per ton of steel, legislation which will soon make it mandatory in the entire Federal German Republic to limit emissions to no more than 1.5 kg dust per ton of liquid iron produced. The choice of the type of dust arrester must be governed by the type of cupola furnace to be served, because hot air blast cupola ovens emit a greater proportion of fine dust (below 10 micron) and a cyclone alone would not guarantee sufficient reduction. Of the various dry dust arresters, the centrifugal type is most frequently used with cupola ovens. Experience showing that small-diameter centrifugal collectors are more efficient than those of a larger diameter has led to the development of multicyclones or multi-cell separators which are especially suited (and inexpensive) to cold air blast cupola ovens and can process 20,000 cu m air/hr. A single cyclone is inadequate because the very large required would result in a loss of efficiency. Fabric filter separators reduce dust emissions well below 1.5 kg/ton but their application is complicated by the high temperature (1000 C) of the gases which must be cooled. Nomex filter material performs well up to 350 C but is expensive. Separation efficiency of these filters is 99.5 to 99.9%. Electrofilters are useful because they handle moist waste gas easily and because dust granulation does not affect efficiency, but they are expensive and space-consuming. Gas washing requires waste water treatment because sulfurous acid soon corrodes the washing towers. Neutralization is costly, and wet separators produce sludge which must be disposed of.

20300 APTIC NO. 39637

Kopita, Robert

ROLE OF WET SCRUBBERS IN INDUSTRIES. *American Inst. of Plant Engineers, Cincinnati, Ohio, West. Plant Eng. Maint. Conf., Proc., San Francisco, Calif., 1970, p. 3/2-3/6. (Nov. 3-5.)*

The design of a dust collection system should be based on the characteristics of dust particles and carrier gas as well as on process, operation, construction, and economic factors. Most wet scrubbers are designed based on the gas volume leaving the unit. Wet scrubbers can remove most particulate matter in addition to removing soluble gaseous components. Curves are presented to show efficiency versus particle size for several classes of equipment. Operating principles and limitations of varous types of scrubbers are discussed. Applications are cited.

20301 APTIC NO. 39533

Kratky, Zd.

THE CONTROL OF EMISSIONS FROM THE OXIDATION OF ASPHALT. *(Likvidacia exhalatov z oxidacie asfaltu). Text in Slovak. Ropa Uhlie, 10(9):472-476, 1968.*

The noxious and malodorous aerosol emission from the oxidation of asphalt can be controlled by scrubbing (in countercurrent scrubbers or in multilevel columns), by adsorption (activated carbon, silica gel, and alumina), by electrofiltration (which has the danger of formation of a coating on electrodes which reduces the effectiveness of the electrical field and danger of explosion), or by catalytic combustion. The liquid hydrocarbon content of the aerosol is of the order of 20 g/cu m and its composition resembles that of the liquid component of the asphalt. Aside from aromatic compounds, benzopyrene, organic sulfur compounds, and nitrogen compounds were identified. The gases in the aerosol consists of hydrocarbons from methane to pentane (0.22% by volume), oxygen 7% by volume, carbon dioxide 1% by volume, carbon monoxide 0.2% by volume, hydrogen sulfide 0.1% by volume, and nitrogen 91.7% by volume. Catalytic oxidation of these waste gases can in some instances be carried out at temperatures as low as 250 C. If the temperature is too low, however, cracking products cover the catalyst with soot and inactivate it. An inadequate quantity of the catalyst shortens contact time and the danger of incomplete combustion increases. Too high a temperature shortens the life of the catalyst: its mechanical strength deteriorates. Optimal temperature is maintained by the addition of cooling air or of steam. Catalysts can be metals or an inactive coating of metal on a ceramic carrier in the form of pellets. The catalysts cannot be regenerated.

20302 APTIC NO. 39657

Kropp, E. P. and R. N. Simonsen

HOW SOHIO FIGHTS AIR POLLUTION. *Oil Gas. J., 51(11):84-85, July 21, 1950. (Presented at the Air Pollution and Smoke Prevention Association of America, Annual Meeting, Cleveland, Ohio, June 9-12, 1952.)*

Potential sources of air pollution from a Cleveland refinery were investigated. The three major sources include acid treating of lubricating oil stocks, grease manufacture, and asphalt manufacture. A pilot-model fog-filter-type scrubber established the utility of this type of unit for the removal of fatty acid odors and for absorption of sulfur dioxide and hydrogen sulfide from air streams containing these comtaminants. The equipment consists of two cylindrical spray towers connected by a cross-over duct. Fume disposal equipment for the asphalt oxidizing consists of collecting pipes which carry the fumes directly to fume burners. A device was also designed and installed to condense the blanketing steam present in the fumes.

20303 APTIC NO. 38988

Kuronuma, Haruo, Kohei Urano, and Raisaku Kiyoura

ADSORPTION OF SULPHUR DIOXIDE BY ACTIVATED CARBON. 1. OXIDATIVE ADSORPTION OF SULPHUR DIOXIDE ON ACTIVATED CARBON. *(Kaisseitan ni yoru aryusan gasu no sanka kyuchaku sokudo). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(10): 1971-1975, Oct. 1971. 7 refs. (Presented at the Chemical Society of Japan, Annual Meeting, 22nd, Tokyo, April 1969.)*

The adsorption rate of sulfur dioxide from synthetic flue gas at 100 C on five activated carbons was proportional to the SO2 (0.05-1.0%), oxygen (1-20%), and steam (1.5-20%) concentrations, but independent of the carbon dioxide and nitrogen concentrations. Adsorption apparently occurred by a fast process that is inhibited by adsorbed sulfuric acid and by a parallel slow process that is not affected by H2SO4. At 70-140 C and a water vapor partial pressure of 1 atm, the concentration of H2SO4 adsorbed on the carbon were comparable with the amounts adsorbed from aqueous H2SO4 under the same conditions. A mechanism and rate equation are proposed.

20304 APTIC NO. 39492

Lacy, G. A.

VEHICLE EMISSIONS - HOW WE ARE WINNING THE WAR ON AIR POLLUTION. *Preprint, Society of Automotive Engineers, Inc., New York, 7p., 1970. (Presented at the Society of Automotive Engineers, Indianapolis Section, Oct. 15, 1970, Paper 710365.)*

Several systems are briefly described for controlling automotive emissions by modifying many of the factors affecting the engine combustion process, for controlling evaporative hydrocarbon losses, and for reducing carbon monoxide emissions. Control of nitrogen oxides is discussed. The technique depends on reducing the peak combustion temperature; however, the same conditions that help to lower hydrocarbon and CO emissions simultaneously help form nitrogen oxides. Aspects of lead particulate control and the purported need for unleaded gasoline are evaluated. Electric, steam, and gas turbine engines are briefly considered as alternative power sources. The requirement for the stringent controls proposed for 1975 is questioned.

20305 APTIC NO. 38718

Lawson, A.

A LOW TEMPERATURE CATALYTIC APPROACH TO NOX CONTROL. *J. Catalysis, 24(2):297-305, Feb. 1972. 14 refs.*

In the absence of water vapor, nitrogen tetroxide appears to be an active species in the catalytic decomposition of nitric oxide/air mixtures at normal reaction temperatures. The other oxides of nitrogen are inactive. When water vapor is present N2O4 becomes inactive due to splitting of the molecule to form active intermediates, and at temperatures above 100 C can only be converted into the extremely stable NO. At temperatures less than 100 C a new species, nitric acid, becomes stable in the gas phase, and it appears that this can be catalytically converted to molecular nitrogen and water. This low temperature approach shows promise for application to vehicular exhaust control. Present engine modifications minimize CO and HC emission which can be further reduced with a suitable oxidation catalyst in the muffler section of the exhaust. In this approach, NOx would then be removed with a tail pipe catalyst. The system has a number of advantages such as ease of catalyst replacement or servicing, and effective performance under all engine operating conditions. (Author conclusions modified)

20306 APTIC NO. 39697

Leroy, Pierre J. and L. Septier

FRENCH PATENT SOLVES FUME PROBLEM IN OXYGEN STEELMAKING. *J. Metals, 7(1):1189-1191, Nov. 1954. 3 refs.*

A pilot plant set up for the recovery of red fumes resulting from oxygen lancing in the prerefining process was described. The prerefining installation consists of a lance for oxygen injection made of copper tubing, a hood provided with a vent where the ladle is placed for the operation, a trailer or truck for carrying the ladle under the hood, and a platform to control the handling of lance and ladle. Preliminary dry purification separates the larger particles and starts cooling the fumes. Wet purification to collect the bulk of the remaining dust is the essence of the process. Purification is done in three consecutive stages: the spray scrubbing tower, the venturi tube, and the cyclone collector. After purification the fumes are exhausted into a 50-foot chimney with a blower.

20307 APTIC NO. 39412

Lewis, I. R. and D. J. Cestoni

SOME AIR POLLUTION PROBLEMS OF A FIRE CHEMICAL MANUFACTURING PLANT. *New Jersey State Dept. of Health, Trenton, Proc. Governor s Conf. Exhibit Atmospheric Pollution, New Jersey, 1952, p. 77-80.*

The air pollution abatement program at a pharmaceutical plant is summarized. Potential air contaminants within the plant are generally of the nuisance type which produce odors rather than create a toxic or hazardous condition in the community. Employees are encouraged to report any obnoxious odors noticed within the plant area, and an educational program is maintained. Insuring proper storage conditions away from any corrosive atmosphere and maintaining a constant check of the storage areas for leaking containers is probably the surest way of preventing air pollution from trimethylamine containers. The control of ammonia and hydrochloric acid vapors is also described. Good housekeeping and equipment maintenance are essential to eliminate fermentation odors from antibiotics production. Air-conditioning, filtration, and good housekeeping are indicated for the control of soot and fly ash.

20308 APTIC NO. 39051

Livbjerg, Hans, and John Villadsen

KINETICS AND EFFECTIVENESS FACTOR FOR SO2 OXIDATION ON AN INDUSTRIAL VANADIUM CATALYST. *Chem. Eng. Sci., 27(1):21-38, Jan. 1972. 35 refs.*

An experimental study of the reaction rate for sulfur dioxide oxidation on a commercial vanadium pentoxide catalyst is presented. Results in the purely kinetic region are correlated by means of 12 published rate expressions. Most rate expressions are adequate only in a narrow temperature and composition range and probably no single rate expression can be applied in the whole range of industrial operation conditions. Experiments with large size pellets are used to determine catalyst effectiveness as a function of temperature and conversion. A serious transport resistance occurs for temperatures greater than or equal to 450 C and the effectiveness decreases somewhat at high conversion. The effective diffusivity of SO2 is determined, and the tortuosity of the catalyst is calculated. Effective diffusivity can be determined on the basis of a gas-phase diffusion model. The tortuosity factor falls within the range of previously published values with a slight increase for high conversion and possibly also for low temperature. (Author abstract modified)

20309 APTIC NO. 38723

Llewellyn, William F.

SUCCESS IN KRAFT MILL ODOUR EMISSION CONTROL - A CASE HISTORY. *Int. Paper. Board Ind., 14(6):22-24, June 1971. (Presented at the Technical association of the Pulp and Paper Industry, Water and Air Conference, 8th.)*

Field experience with kraft mill siting and odor control is reviewed. The major sources and control equipment included a recovery boiler electrostatic precipitator, a lime kiln Venturi scrubber, a dissolving tank vent equipped with a suitable scrubber, and a black liquor oxidation system. The digester was equipped with a condenser and non-condensible gases are conveyed to the lime kiln for thermal oxidation. Any reduced sulfur compounds still released in the evaporators after black liquor oxidation are incinerated in the lime kiln after removal of water vapor with a condenser. Off-gases from the black liquor oxidation system and the lime kiln scrubber are discharged with the recovery boiler flue gases through the main stack. Brown stock and chlorine stage hood exhausts are discharged through suitable scrubbers.

20310 APTIC NO. 38744

Loehner, Kurt, Herbert Mueller, and Otto Willenbockel

COMPARISON BETWEEN L-SHAPED AND RECTANGULAR PISTON RINGS WITH RESPECT TO POLLUTION. *(Vergleich eines L-foermigen Kolbenringes mit einem rechteckigen Kompressionsring im Hinblick auf den Schadstoffgehalt der Abgase eines Ottomotors). Text in German. Motortech. Z. (Stuttgart), 31(12):512-517, Dec. 1970. 10 refs.*

Modifications of piston ring armature were tested on a Volkswagen engine in an attempt to achieve decreased hydrocarbon levels in the exhaust. Application of L-shaped compression rings had no effects on carbon monoxide or hydrocarbon emission as compared to the use of conventional rectangular compression rings. Conventional rectangular rings applied on the top portion of the piston allow a 15% hydrocarbon contribution to the total HC emission. Application of L-shaped rings produced no decrease of clearance between piston and cylinder, and thus no lowering effects on the total HC emission could be achieved.

20311 APTIC NO. 39228

Madelaine, Guy and Lucien Roure

CONTRIBUTION TO THE STUDY OF THE ELECTROSTATIC PRECIPITATION OF AEROSOLS. *(Contribution a l etude de la precipitation electrostatique des aerosols). Text in French. Commissariat a l Energie Atomique, Fontenay-aux-Roses (France) and Societe Bertinet Cie., Plaisir (France), Rept. CEA-R-3069, 48p., Sept. 1966. 6 refs.*

The theory of the electrostatic precipitation of ions in a cylindrical collector consisting of an external armature and a central axial electrode (copper wire) is reviewed and aerodynamic factors affecting the quality of the flow are developed. Hypotheses concerning the laminarity of the gas flow were verified experimentally; the experiments disclosed that the presence of a guard tube ensures the maintenance of steady flow velocity and at the same time reduces electrical field end effects, thus yielding a more accurate picture of the distribution of the captured particles. Without a guard tube the error between calculation and experimentally obtained values can reach 50%. Calculations by approximation indicate that forces of gravity and inertia acting on ionized particles do not exert a noticeable effect on particles at densities normally encountered. The calculation of the required length of an electrostatic precipitator for a given particle velocity is demonstrated using an example involving radioactive particles.

20312 APTIC NO. 39530

Maguire, M.

SOME GENERAL ASPECTS OF THE FIGHT AGAINST DUST IN THE MINES IN GREAT BRITAIN. *(Quelques aspects generaux de la lutte contre les poussieres dans les mines en Grand-Bretagne). Text in French. Inst. National de Securite pour la Prevention des Accidents du Travail et des Maladies Professionelles, Paris (France), Colloq. Poussieres Ind., Strasbourg, France, 1954. p. 50-52. (Oct. 13.)*

In assessing the risk of pneumoconiosis to coal miners, the Institute for Mining Research in Sheffield, England is conducting an analytical investigation into questions of dustiness, dust composition methods for dust sampling, and means for improving working conditions. The last-mentioned factor may have a direct bearing on productivity. Reduction in dustiness or of its effects as a means of cutting down the risk of silicosis can be attained by one or more of the following steps: (a) replacing of dust generating operations with other operations which generate less dust; (b) modifying or adjusting mining equipment in such a manner that less dust is created or emitted into the air; (c) introducing of dust control measures; (d) augmenting or improving ventilation; and (e) using protective equipment for the personnel, such as masks. Two types of sampling are conducted: one to measure the dust levels to which operators are exposed directly in their work location, the other to measure the total quantity of dust emitted into the air during the work period. A direct relation between the two values usually exists if the operator stays in one particular working place. If the purpose of testing is to establish a relationship between dust concentration and the incidence of pneumoconiosis, the first-mentioned type of sampling is indicated. If, however, it is intended to decrease and control the rate of dustiness, the second type which is less costly and most effective, is called for.

20313 APTIC NO. 39536

Mapes, W. H. and R. F. Vance

EFFICIENCY EVALUATION OF ODOR CONTROL DEVICES. *Preprint, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., New York, 5p., 1971. 11 refs. (Presented at the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Annual Meeting, Washington, D. C., Aug. 22-25, 1971, Paper 2195.)*

A system for experimentally determining the odorant adsorption efficiencies of thin charcoal filters was constructed. The system employs recycling of the contaminant air stream, and measurements of odorant concentration in a ballast chamber are made as a function of time. The odor removal efficiency is then calculated from a mass balance model. Results are presented for two very thin charcoal-fiber composite materials which has initial efficiencies of approximately 50% under the experimental conditions employed. Measurement results are in agreement with those obtained with the concentration ratio method normally used for measuring filter efficiencies. (Author summary modified)

20314 APTIC NO. 39752

Martens, David C.

AVAILABILITY OF PLANT NUTRIENTS IN FLY ASH. *Compost Sci., 12(6):15-19, Nov./Dec. 1971. 21 refs.*

The feasibility of using fly ash in soil applications to correct certain nutrient deficiencies of plants is examined. Fly ash was obtained from power generating plants and analyzed for boron, phosphorus, and zinc content and neutralizing power. The boron, phosphorus, and zinc content and pH value of various soils were also determined. The fly ash samples varied in their ability to neutralize soil; less neutralization of soil would occur from applicationof the alkaline fly ash samples than from application of the same level od calcium carbonate. The total content of the elements in the soils ranged within 4-98 ppm for boron, 0.02- 0.08% for phosphorus, and 10-300 ppm for zinc. All the fly ash samples contained a higher boron content than usually occurs in soils; five of the smaples had greater amounts of phosphorus and three samples contained higher zinc values than those in soils. The application of selected fly ash samples may be beneficial for crop production, but quality control measures will still be required.

20315 *APTIC NO. 39695*

Martin, Herschel

LOW-COST, PRACTICAL SMOKE CONTROL. Oil Gas J., 55(8):116-118, Feb. 25, 1957. (Presented at the Air Pollution Control Association Meeting, Houston, Tex.)

The design of smokeless flares for use in refinery operations is described. The chief concern is to burn the hydrocarbon completely and quickly to water vapor and carbon dioxide with as little smoke as possible. There are several methods that can be used to supply the necessary oxygen in the varying amounts needed to make a flare smokeless. Some refineries use a venturi-type of air-aspirating burner. This burner is of conventional design which utilizes a gas orifice and venturi correct ratio for optimum firing conditions. Disadvantages are that a correct design ratio of gas to venturi orifice for one type of gas can hardly be correct for all gases and that under some conditions the flare will produce smoke. This type of system also requires elaborate and expensive pressure and flow controlling equipment. Another expensive method of eliminating smoke from burning hydrocarbons in flares is to supply the necessary excess air with blowers. A third method for suppressing smoke is the injection of either water or steam directly into the flare. The only problem in the design is to insure that the proper amount of water vapor is present at the proper moment.

20316 APTIC NO. 39033

Masuda, Makihiko and Koshiro Miyahara

MECHANISM OF OXIDATION OF SULFUR DIOXIDE CATALYZED BY PLATINUM. *J. Res. Inst. Catalysis, Hokkaido Univ., 19(2):85-98, 1971. 8 refs*

The mechanism of catalytic oxidation of sulfur dioxide on a platinum catalyst analyzed in a previous study was not consistent in the application of the theory of the stoichiometric number. The experimental results were reexamined by studying the forward and backward unidirectional rates of the oxygen transfers among oxygen, SO2, and sulfur trioxide in the reaction 2SO2 + O2 equals 2SO3. Although the sequence of the three steps assumed by the previous analysis was effective in a consistent interpretation of the experimental results, the investigation concluded that the first step was the slowest and the last step was nearly in equilibrium, thus disproving the contention that the last step was rate-determining. (Author abstract modified)

20317 APTIC NO. 39335

Matsumoto, Takanobu

MINERAL OIL HYDRODESULFURIZATION PROCESS USING CONTACT REACTION WITH GRANULAR SOLID CATALYST. *(Koyu rui no ryudo kotai sesshoku hanno ho). Text in Japanese. (Ministry of International Trade and Industry (Japan), Public Nuisance Resources Research Inst.) Japan. Pat. Sho 47-4628. 3p., Feb. 8, 1972. (Appl. Sept. 5, 1969. 1 claim).*

This invention offers the new contact reaction-type hydrodesulfurization process in which the gas-liquid mixture is jetted into the fine-grain solid catalyst layer in the reaction column and then stirred by clever use of the velocity head for uniform and thorough contact of the gas-liquid mixture with the fine-grain solid catalyst. In the cylindrical main casing of the reaction column is an inner tube concentrically installed on the bottom of the main casing. This inner tube is divided into two halves by a screen net installed horizontally. The upper half is packed up with the fine-grain solid catalyst while the lower half is empty. The gas-liquid injection nozzle is inserted through the bottom into the empty lower half. A mixture of hydrogen gas and mineral oil is jetted into the packed layer of the catalyst. This mixture then flows upward through the layer. As it reaches the top end of the layer it begins to flow downward along the space between the inner tube and the main casing. It then goes into the lower half of the inner tube through communicating holes and moves upward again to complete a cycle of circulation. After being treated in the column for some time, it goes out of the column through the discharge port provided in the uppermost part of the column, and finally reaches a gas separation column provided outside. The test results have indicated that the highest efficiency is obtained when the sectional area of the inner tube is 0.45-0.61 times that of the main casing and the height of the inner tube is 0.64-0.82 times that from the bottom of the main casing to the discharge port.

20318 APTIC NO. 39709

McCabe, Louis C.

ATMOSPHERIC POLLUTION. *Ind. Eng. Chem., 43(3):89A-90A, 92A, March 1951. 2 refs.*

In 1949 the Columbia Steel Co., a west coast subsidiary of United States Steel, made a thorough investigation of the dust problem at the company's Torrance, Calif., works which led to a pilot plant test of an electrical precipitator. This was followed by the first plant scale installation of this type equipment on an open-hearth furnace. Now in continuous operation for several months, it is operating at 97.9% efficiency. Plant records of operating conditions which established a basis for the design and operating scale of the electrical precipitator pilot unit are indicated. The particle size and chemical composition of the dust is discussed.

20319 APTIC NO. 39377

Meerovskaya, V. I., R. Z. Khiterer, and E. A. Kazakova

EFFECT OF CARBON DIOXIDE ON ADSORPTION OF NITROGEN DIOXIDE BY SILICAGEL FROM DRY NITROUS GAS. *(Vliyaniye dvuokisi ugleroda na adsorptsiyu silikagelem dvuokisi azota iz sukhogo nitroznogo gaza). Text in Russian. Khim. Prom. (Moscow), no. 1:42-46, 1972. 5 refs.*

Experiments on the effect of carbon dioxide on the adsorption of nitrogen dioxide on silicagel, as applied in experimental processes for nitric acid production from atmospheric nitrogen, are described. In preliminary studies, the adsorption of CO2 in 8.8-100% concentrations at 20 C and O C and atmospheric pressure was investigated. The adsorption was made in boiling silicagel layer of 30 mm thickness at a gas flow rate of 4.5 cm/sec. Increased amount of adsorbed CO2 with decreasing temperatures and increasing CO2 concentrations was observed. The adsorption could be described by means of Langmuir equations up to 50% concentration. The experimental data could be described in equilibrium adsorption equations, taking a correlation coefficient of 1.3 into account. Using laboratory equipment under dynamic conditions, the effect of CO2 on the adsorption of nitrogen-oxides was determined by means of isothermal diagrams for NO2 adsorption at O C and 20 C with CO2 concentrations of 10, 15, and 50% by volume. Considerable amounts of CO2 showed a strong effect on the NO2 adsorption. Little amounts of CO2, adsorbed in the adsorber, decreased the NO2 adsorbing power of the sorbent in the upper plates of the column, which required the number of plates to be increased by more than twofold, as well as an increase of 1.37 in the sorbent circulation.

20320 APTIC NO. 39205

Meinhold, Ted F.

THILMANY RECLAIMS 90% OF CHEMICALS FROM FLUE GAS. *Chem. Process. (Chicago), 19(8):14-15, March 1956.*

When pulp production at a pulp and paper plant was boosted to 165 tons per day, a 250-ton, 600-psi, Babcock and Wilcox recovery unit equipped with a black liquor venturi scrubber was installed to keep pace with the added production. The venturi scrubber on the new unit used black liquor for scrubbing, making it possible to clean the flue gases, lower their temperature, and further concentrate the black liquor at the same time. Operation of the scrubber is described. The flue gas leaving the scrubber has a concentration of 0.4 grains dust per cu ft, compared with an entrance concentration of 3.9 grains, resulting in a chemical recovery efficiency of 90%.

20321 APTIC NO. 39155

Meissner, A.

THE CUENOD-ANTI-SMOG BURNER TYPE PCE WITH WATER EMULSION AND CLEAN COMBUSTION. *(Der Cuenod-Anti-Smog-Brenner Typ PCE mit Wasseremulsion und sauberer Verbrennung). Text in German. Schweiz. Bauztg., 90(15):358-362, April 1972.*

The design for a modified oil burner to reduce emissions that contribute to smog formation is examined. The new burner is operated with light, medium, or heavy fuel oil plus a certain percentage of water. The fraction of unburned solid hydrocarbon residues at this combustion is 5-10% less than with conventional combustion processes. The air surplus can be reduced to decrease the sulfur trioxide concentration of the flue gas to one-third. The water supply line of the burner is equipped with a dosing device which automatically maintains a desired mixing ratio. In the preheaters, water and fuel oil are warmed to a temperature which favors the formation of emulsions. A pump maintains the mixture under the necessary atomization pressure. The combustion air supplied by the blower passes through the burner. A fan at the burner nozzle sets the air into a rotary movement. For optimum results, 25% water by weight of the fuel oil throughput is required.

20322 APTIC NO. 39734

Meltzer, Joseph and Donald Lapedes

HYBRID HEAT ENGINE/ELECTRIC SYSTEMS STUDY. VOL. II: APPENDICES A THROUGH F. (FINAL REPORT). *Aerospace Corp., El Segundo, Calif., Office of Corporate Planning, Environmental Protection Agency Contract FO4701-70-C-0059, Rept. TOR-0059(6769-01)-2, 319p., June 1, 1971. 99 refs.*

Supplementary data forming the appendices to the final report of a study of hybrid heat engine/electric systems are presented. Included are the input list for the computer program used to evaluate hybrid vehicle performance; data on exhaust emission characteristics of the five types of heat engines considered in the study; emission data for spark ignition and diesel engines tested over the seven-mode and DHEW driving cycles and under steady-state engine conditions; emission cycle performance characteristics of a family car, a commuter car, a delivery van, and an intracity bus; and SFC data for representative heat engines. The five types of heat engines considered in the hybrid vehicle study were spark ignition, compression ignition (diesel), gas turbine engine, Rankine cycle (steam), and Stirling cycle. Design and operating variables influencing emissions from these engines are analyzed, and ways of reducing emissions are reviewed.

20323 APTIC NO. 39096

Millichamp, David

LEAN MIXTURES ARE CLUE TO CLEANING UP MOTOR EXHAUSTS. *Engineer (London), 234(6055):30-31, March 30, 1972.*

Research at Shell s Thornton Research Center near Chester, England, suggests that it is possible to reduce the nitrogen oxides produced in the combustion process by a lean mixture method. The idea is to burn the usual air-gasoline mix at a ratio of about 22:1 instead of the usual 14:1 or thereabouts. Usually this results in serious misfiring and overheating because providing a mixture sufficiently homogeneous throughout the whole volume in the combustion chamber is extremely difficult. It cannot be achieved using conventional carburetors or fuel injection, but by using a special mixture generator to provide a suitable air-fuel mix 22:1, shell has demonstrated a drastic reduction in emission of carbon monoxide and oxides of nitrogen. Catalyst systems and the control of crankcase emissions are discussed.

20324 APTIC NO. 39598

Miyagawa, Hisaki

DORR-TYPE DYNAMIC WASTE FURNACES. *(Dorushiki ryudo shokyaku setsubi ni tsuite). Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(8):23-32, 1971.*

The efficiency and operation of a Dorr-type dynamic waste furnace are examined. In a fluidized bed reactor containing hot sand, a dehydrated cake from sewage sludge was combusted at 705 deg and an 0.16 excess air ratio in the presence of 4.07% ferric chloride and 12.87% calcium hydroxide. The resulting waste gas contained 82.1% nitrogen, 15.6% carbon dioxide, 0.9% carbon monoxide, and 2.9% oxygen. The dust collection efficiency of the scrubber was 99%. The apparatus consisted of a cake supplier, reactor, heat exchangers, cyclones, and scrubbers.

20325 APTIC NO. 39027

Miyata, Ken and Yoshibumi Takayama

GAS DISTRIBUTOR PLATE OF ELECTRIC DUST REMOVER. *(Denki shujinki no gas bunpuban). Text in Japanese. (Furukawa Mining Co., Ltd. (Japan)) Japan. Pat. Sho 47-1515. 2p. Jan 19, 1972. (Appl. Oct. 9, 1968, 1 claim).*

An electric dust remover is usually provided with two gas distributor plates, one installed before the dust-arresting section consisting of dust-arresting electrodes, discharge electrode frame, and discharge lines and the other thereafter. The plate is used for the uniform distribution of gas. The conventional distributor plate is either of a lattice construction using flat or shape steels arranged to cross each other at a right angle to form rectangular meshes or of steel plate provided with a number of round holes. To make the new distributor plate suggested herein, a number of channel steels are arranged to cross each other in a slanting position, thereby making each mesh diamond-shaped. Each component channel steel is provided with a number of small holes. When the total area of the meshes of the plate is limited to 30% or lower of the total plate area, most of gas taken in is intercepted by the plate and makes a vortex current before it, whereupon most of dust contained in the gas adheres to the inner surface of the groove of each channel steel as the gas flows through the plate. Since each channel steel is provided with small holes, the gas trapped in the groove is less likely to eddy, so that, once stopped inside, dust may not fly out. For removal of dust deposited on the channel steels, a hammering device is installed above the distributor plate. For more effective removal of dust, the distributor plate is mounted about 60 deg from the horizontal.

20326 APTIC NO. 38737

Miyazaki, Kazuo and Tetsunori Yamamoto

THERMAL ELECTRIC BOILER STACK GAS WET-METHOD DESULFURIZATION AT THE KAWASAKI PLANT OF THE SHOWA ELECTRIC INDUSTRIES. *(Showa denko Kawasaki kojo ni okeru karyoku hatsuden boira no shisshiki haien datsuryu). Text in Japanese. Xaryoku Hatsuden (Thermoelectric Power Generation), 23(1):54-56, Jan. 1972.*

The statistics of the desulfurization system at the Kawasaki Plant are as follows: the power production is 16,000 kW, steam quantity is 150 t/hr, oil consumption 11.15 t/hr, sulfur content in heavy oil 2.7%, stack gas 150,000 N cu m/hr, stack gas temperature 180 C, sulfur oxides absorption rate 95%, and sodium sulfite (100% exchange) production 6000 t/yr. The characteristics of the system are as follows: the pretreatment of the gas is not required; highly pure sodium sulfite is produced as a by-product; the system is compact and the power cost is small; the selective absorption of sulfur dioxide is possible; special corrosion control is achieved; little manpower is needed; and the desulfurization rate is high (90 95%). The exhaust gas from the thermal electric boiler is directly led to the absorption tower by a blower. Sulfur dioxide in the gas is absorbed by the solution of sodium sulfite in the absorption tower, where absorption of carbon dioxide is controlled. The pH of the circulating liquid in the absorption tower is constantly adjusted by water and sodium hydroxide solution and absorbs SO2 selectively. When the pH is adjusted to more than 7, almost all of SO2 in the gas is absorbed, leaving approximately 10 ppm SO2 in the gas emission. However, the absorbent must not be permitted to become alkaline. Carbon and heavy metals are eliminated from the circulating liquid and 20 wt% sodium sulfite solution is produced. The purified gas from the absorption tower may be emitted as is. If steam condensation creates white smoke, the gas may be heated before emission. An average of 2 to 3% of total boiler fuel consumption/yr is necessary for heating the gas for prevention of white smoke. The absorption tower is a vertical conical structure without any rotating parts or complex mechanism; the operation is easy and inexpensive. The circulation of the absorbent is achieved without a pump. The gas flow rate is fast and is 20 to 50 m/sec at the narrowest spot of the tower.

20327 APTIC NO. 39134

Mizunoue, Yoshitaka

SELECTION OF FLARE TIPS WITH CONSIDERATION OF PUBLIC NUISANCE. *(Kogai o koryo shita furea chipu no sentei). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(4):53-56, April 1972.*

Three types of flare tips used with three flare stacks in the Mitsui Iwakuni ethylene plants were reviewed for comparison of their performance. In the Iwakuni Factory, the flare gas from the ethylene plant is first taken into the knockout drum for separation of the liquids and mists. Then it enters the seal drum, which is water-sealed to prevent back fire into the flare gas duct. The gas goes to the flare stack, via the flow meter combined with the S/G ratio setter connected to the steam pipe. A flare stack is likely to cause noise, black smoke, flare illumination, radiation heat, and gas diffusion. The type of the flare tip, location and height of the flare stack, and steam injection volume versus gas discharge volume should all be considered to prevent these nuisances. Three types of tips are described along with operating variables and noise produced.

20328 APTIC NO. 39282

Moncrieff, R. W.

THE COUNTERACTION OF ODORS. *Chem. Can., vol. 11:66, 68, 70, 72, Sept. 1959. 16 refs.*

In the past, odor counteraction was applied only to products. Today the objectional effluent odor from herring reduction factories pulp mills, sewage plants, and many other industrial scenes are counteracted by spraying suitable chemicals into the exhaust gases at chosen points. Effective counteractants are known for most classes of malodors likely to be encountered in industry. Work still in progress shows that counteraction can be achieved with many pairs of odorants. For instance, mixtures of butyric acid and oil of juniper, as well as mixtures of pyridine and oil of wintergreen, can be adjusted so that neither of the two components can be identified. An olfactometer can be used to mix odors and regulate their amount.

20329 APTIC NO. 39769

Moneanu, Chiril

SUGGESTIONS FOR IMPROVING CYCLONE WASHERS DESIGNED FOR DUST COLLECTION IN FOUNDRIES. *(Propuneri privind perfectionarea hidrocloanelor destinate desprafuirii aerului in turnatorii). Text in Rumanian. Construct. Masini, 23(30:173-177, 1971.*

The operating deficiencies of Romanian-made wet cyclones for dust removal from industrial waste gases are reviewed and improvements deduced from optimization studies are presented. Included are graphs describing pressure drops under various air flow rates and varying water level conditions along with sketches of the suggested water level control device, droplet collector, and cyclone unit. Appropriate water levels and air flow rates within the cyclone constitute the essential factors in determining the efficiency of dust removal from waste gases. A water level control device along with a droplet collector to provide recovery of water droplets from the exhaust are described. The droplet collector should be applied at the outlet from the cyclone before the gas mixture is directed to the fan. The appropriate pressure drop of about 130 mm water column and the maintenance of appropriate water levels within the wet cyclone should provide a dust removal efficiency of 99%. These improvements can be made from in-house resources available at any metallurgical processing or chemical plant, and thus would reduce the pollution of the environmental air.

20330 APTIC NO. 38713

Montzka, Manfred

PROCEDURE AND DEVICE FOR REMOVAL OF CHLORINE AND HYDROGEN CHLORIDE FROM HOT COMBUSTION GASES. *(Verfahren und Vorrichtung zum Entfernen von Chlor und Chlorwasserstoff aus heissen Verbrennungsgasen). Text in German. (Deutsche Richard Kablitz Gesellschaft fuer Oekonomie der Dampferzeugungskosten, Lauda Baden (West Germany) und Feuerungskontrolle Richard Kablitz G.m.b.H. und Co. KG, Lauda/Baden (West Germany)) W. Ger. Pat. Appl. 2,015,996. 8p., March 26, 1970. (7 claims).*

The design and apparatus for a process for the removal of chlorine and hydrogen chloride from hot combustion gases to prevent corrosion of incinerators which burn plastic refuse are presented. The hot gases are passed through a layer of iron turnings where iron chlorides are formed for subsequent filtration from the gas by scrubbers or electrostatic precipitators after cooling. Previous measures for the prevention of corrosion have consisted of limiting temperatures to 250 C by operating at low pressure in steam boilers. These processes, however, did not achieve total escape from corrosion by chlorine.

20331 APTIC NO. 39429

Moorman, Robert, Jr.

CONTROLLING ODORS FROM CATTLE FEED LOTS AND MANURE DEHYDRATION OPERATIONS. *J. Air Pollution Control Assoc., 15(1):34-35, Jan. 1956.*

Odor problems at cattle feed lots can be alleviated by a regular manure removal program plus strict attention to water drainage, feed spoilage, and carcass removal. Satisfactory methods of handling the collected manure include composting, dehydration, and spreading on fields in sparsely settled areas followed by plowing under. Additional control of feed-lot odors is obtained with ground or air spray systems using odor counteractants. The systems generally provide satisfactory control of odors from feeding pens and storage sites and are being increasingly applied to keep down odors during the storage and handling of manure prior to dehydrating. Dehydrating itself is becoming more necessary as manure production expands. This type of operation requires good design of the dehydrating unit; careful control of product flow; and an understanding of proper storage methods.

20332 APTIC NO. 39773

Morgan, J. P. and F. E. Murray

A COMPARISON OF AIR AND STEAM STRIPPING AS METHODS TO REDUCE KRAFT PULP MILL ODOUR AND TOXICITY FROM CONTAMINATED CONDENSATE. *Pulp Paper Mag. Can. (Quebec), 73(5):62-66, May 1972. 6 refs. (Presented at the Canadian Pulp and Paper*

Association, Technical Section, Air and Stream Improvement Conference, 6th, Quebec, Ontario, April 13-15, 1971.)

The relative ease of removal of methyl mercaptan, methyl sulfide, methyl disulfide, and terpineol is illustrated for an air stripper operating with air flow-rates such that the gases from the tower are well below the lower explosive limit. A theoretical comparison of air and steam stripping, combined with thermal oxidation of malodorous noncondensables is made for a 750 t/day kraft pulp mill. Air stripping, when combined with burning, is a less complicated system and has significantly lower operating costs. Steam stripping combined with burning would be recommended, should recovery of turpentine be worthwhile. Recovery of other by-products by steam stripping, such as methanol, could be feasible in a few cases. (Author abstract)

20333 APTIC NO. 39074

Moriyama, Aritsune

CYCLONE SEPARATOR PROVIDED WITH GROOVES IN THE INTERNAL WALL AND EQUIPPED WITH A DEVICE TO TAKE OUT THE SEPARATED PARTICULATES. *(Naiheki ni mizobu oyobi biryushi doshutsu sochi o mooketa saikuron bunriki). Text in Japanese. (Sanko Kuki Sochi K. K. (Japan)) Japan. Pat. Sho 47-1509. 2p., Jan. 19, 1972. (Appl. May 2, 1969, 1 claim).*

A cyclone type separator is used for separation of solids from a liquid or gas. The separator features the grooves provided in the internal wall of the cyclone and a device combined with the grooves for taking out the separated solid suspension. A number of vertical grooves are provided in the internal wall of the cone-shaped tube of the cyclone. Under the cone is the particulates retainer tank which receives the separated particles. Each groove is connected to this retainer tank by means of a duct. As a liquid or gas containing a solid suspension such as fine-grain dust is injected in the tangential direction into the cyclone, the particulates are centrifugally separated and become deposited in the grooves, each of which is a dead water region, also by centrifugal force. The particulates deposited in the grooves are then taken out through the ducts leading to the retainer tank while the gas removed of the particles is taken out through the discharge port provided in the top side of the cyclone. Since the particulates are arrested by the grooves, from which they are immediately discharged through the ducts into the retainer tank, their chances to hit and rub the internal wall of the cyclone are reduced. This minimizes abrasion of the internal wall. Another advantage is that, once arrested in the grooves, the separated particulates are less likely to get mixed again with the gas from which they were separated.

20334 APTIC NO. 39265

Moroz, William J.

THE ENGINEERING APPROACH TO ENVIRONMENTAL CONTROL. *Preprint, Inst. of Combustion and Fuel Technology, Ottawa (Ontario), 10p., 1970. 9 refs. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31-June 3, 1970, Paper ICF-C-NAFTC-3.)*

Environmental pollution control with respect to engineering design and systems analysis is examined. Relative gains in control from measures such as control of chemical input to a process, process modification, contaminant removal, or dilution through tall stacks and alternatives to these measures, i.e., reuse, recycling, and recovery of waste energy are discussed. If waste energy can be utilized, thermal pollution will be reduced and, at the same time, less fuel will be required so contaminant emissions to the atmosphere will decrease.

20335 APTIC NO. 388640

Motohiro, Terushige

ODOR ELIMINATION OF COMPOUND FEED FACTORY BY WATER SCRUBBING AND ITS PROBLEMS. *(Suisenho ni yoru haigo shiryo kojo no akushu jokyo to mondaiten). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 1(5):26-32, Aug. 1971. 9 refs.*

Bad odor, discharged from compound feed and fish-meal manufacturing factories, is presently eliminated mostly by water scrubbing. However, because it is difficult to remove bad odor completely by water scrubbing alone, other measures have been tested and are used jointly with water scrubbing to eliminate odor. The utilization of asbestos sheets inside the water cleaning tower and with chlorination are some of the ways proven very effective to remove odor when they are incorporated in the water scrubbing processes. One of the problems caused by water scrubbing, however, is that the better the result of odor elimination, the more the element of bad odor seeps into the water used for cleaning; thus the disposed water will be eventually dispersed into ambient air by evaporation. Another problem is that the disposed water may find its way into a river, waterway or bay, and thus become a source of water pollution. Studies should be made in the future in order to find a solution to cope with the disposed water after its odor elimination process.

20336 APTIC NO. 39397

Muehlberg, E.

EXHAUST GAS RECIRCULATION IN INTERNAL COMBUSTION ENGINES, PARTICULARLY IN DIESEL ENGINES. PART 2. *(Abgasrueckfuehrung bei Verbrennungskraftmaschinen, insbesondere bei Dieselmotoren. Teil 2). Text in German. Motortech. Z. (Stuttgart), 32(9): 327-336, Sept. 1971. 3 refs.*

Bench and field tests on the effects of exhaust gas recirculation in diesel and other internal combustion engines are described. Diesel engines without increased compression ratio showed reduced sensitivity for the type of fuel used when exhaust recirculation was applied. An engine with normal compression and exhaust recirculation was powered by a highly aromatic premium gasoline smoothly and with exhaust temperature normal even under lowest loads, though straight run gasoline with no lead would have yielded better results. Tests on an ethyl alcohol-fueled multi- fuel tractor diesel engine revealed reductions of more than 10% in the specific fuel calorie consumption compared to diesel oil operation without recirculation, as well as satisfactory acceleration. Also methanol and azeotropic mixtures of ethanol and methanol were used successfully. The application of reduced compressions was made possible by the exhaust recirculation in diesel engines with and without pressure charge, and an optimum recirculation control in low-compression engines without pressure charge resulted in both reduced fuel consumption and minimum smoking regardless of load and speed. The disadvantages involved in reduced compression in engines with pressure charge were largely eliminated by the exhaust recirculation. The start of low-compression engines was considerably improved by the recirculation. Exhaust gas recirculation would be effective in rotary-piston and hybrid engines as well. The external ejector recirculation of some 50% of the combustion gas oil atomizing burners resulted in an abrupt decrease of soot (the smoke number reduced from 9.8 to 0.3), and considerably decreased nitrogen oxides, carbon monoxide, and hydrocarbons. Different procedures for the internal recirculation in two and four- stroke diesel engines are being tested. While the external recirculation is most advantageous for gas turbines, it is capable of noticeably reducing nitrogen oxides, aldehydes, hydrocarbons, carbon monoxide, and organic acids in diesel exhaust under zero to medium loads.

20337 APTIC NO. 39519

Muhlrad, W.

THE PROBLEM OF THE SMOKES EMITTED BY ELECTROMETALLURGICAL FURNACES. *(Probleme des fumees emises par les fours electrometallurgiques). Chaleur Ind., no. 422:237-255, Sept. 1960. 6 refs. Translated from French. 53p.*

Problems, techniques, and equipment involved in controlling smoke from electrometallurgical furnaces are considered. The dusts from electric furnaces are extremely fine, and the topographic locations of most of the factories favor inversions. The characteristics of different types of furnaces and the nature of their smoke emissions are described. Ferrosilicon furnaces, ferromanganese and ferrosilicon-ferromanganese furnaces, ferrochrome and ferrosilicon-chrome furnaces, ferrotungsten furnaces, ferronickel furnaces, calcium carbide furnaces, and aluminum electrolysis tanks are included. Dust filtration, precipitators, and scrubbers are indicated for control purposes.

20338 APTIC NO. 39026

Muroki, Takumi

DEVICE TO SILENCE SECONDARY AIR FOR COMBUSTION OF EXHAUST GAS. *(Haiki gasu nensho yo nijikuki no shoon sochi). Text in Japanese. (Toyo Kogyo Co., Ltd. (Japan)) Japan. Pat. Sho 47-1443. 3p., Jan. 19, 1972. (Appl. April 2, 1969, 1 claim).*

A branch pipe branched out from the secondary air intake pipe is equipped with a positive relief valve which is so electromagnetically interlocked with the engine that it may open when the rpm of the engine reaches the prefixed value or higher. As the valve opens, the secondary air is led through an air pipe into the air cleaner of the engine where possible noise caused by discharge of the secondary air is silenced. The secondary air intake pipe is equipped with a check valve to prevent backfire and is connected to the exhaust pipe of the engine. A branch pipe branched out from the secondary air intake pipe is connected to the positive relief valve, from which it goes further into the air cleaner. Another branch pipe equipped with a relief valve short circuits the secondary air intake pipe with the pipe connecting the positive relief valve to the air cleaner. Still another air pipe is branched out from the air intake pipe connecting the air cleaner with the engine. This third branch pipe, which is a negative pressure pipe, runs downward and is connected to the bottom of the positive relief valve unit. When the engine is operating in idling or at low rpm, the electromagnetic valve opens this negative pressure pipe whose negative pressure makes the positive relief valve close, so that the secondary air is jetted into the exhaust pipe. When the engine is operating at high speed, the electromagnetic valve closes the negative pressure pipe to make the positive relief valve open, so that all the secondary air will flow into the air cleaner. Since the air cleaner is large in volume, it gives a silencing effect, generating no noise even when large volumes of the secondary air flow in.

20339 APTIC NO. 38978

Myers, John G. and Joseph H. Field

PREPARATION OF ABSORBENTS FOR SULFUR OXIDE REMOVAL. *(Dept. of Interior, Washington, D. C.) U. S. Pat. 3,630,943. 7p., Dec. 28, 1971. 4 refs. (Appl Aug. 14, 1969, 6 claims).*

Fuel or flue-gas additives for reducing sulfur oxides emissions have the disadvantage of high cost and inability to undergo regeneration. Direct oxidation of SO2 to SO3 is possible but the ultimate sulfuric acid product is usually dilute. Reduction of sulfur oxides to sulfur is not economical. Wet absorption and dry adsorption processes require cooling of flue gas to below 100 C and produce a gas saturated with water vapor. Dry absorbents, e.g., alkalized alumina and manganese oxide, are able to operate at moderately high temperatures, but the operational costs are prohibitive for large-scale use. In the method described, improved absorbents are obtained from mixtures of sulfate salts selected from the group consisting of aluminum sulfate-copper sulfate, copper sulfate-iron sulfate; and iron sulfate-aluminum sulfate. The mixtures are thermally decomposed at 750-900 C to the corresponding oxides and formed into spheres, pellets, tablets, or granules. The absorbents can be used unsupported or on a support material such as silica or alumina. In either case, the absorbents can be regenerated with hydrogen at 350-450 C or by heating, in a nonreducing environment, to 750-900 C.

20340 APTIC NO. 38946

Myers, Phillip S.

METHOD AND APPARATUS FOR REDUCING EXHAUST EMISSIONS AND IMPROVING FUEL UTILIZATION IN INTERNAL COMBUSTION ENGINES. *(Assignee not given.) U. S. Pat. 3,625,189. 9p., Dec. 7, 1971. 1 ref. (Appl. Feb. 2, 1970, 2 claims).*

Present methods for controlling exhaust gases from internal combustion engines at best will reduce either carbon monoxide and hydrocarbon emissions or nitrogen oxides, never all three. The invention comprises a method and apparatus for markedly reducing the three undesirable exhaust gas constituents by producing a stratified charge in the combustion chamber at less than full engine load. One constituent of the stratified charge is exhaust gas, mixed with air if desired; the other is a fuel-air mixture, mixed with exhaust gases if desired, controlled to reduce nitrogen oxides. The exhaust gas portion of the exhaust gas-air mixture at all partial loads is selected from that portion of the exhaust gases which is formed by the burning of the fuel-air mixture constitutent of a previous stratified charge. At relatively heavy engine loads, when all exhaust gases formed by the burning of the fuel-air mixture constituent of a previous stratified charge cannot be recycled, a secondary selection is made to recycle either the bulk gases (high in carbon monoxide) or the quench gases (high in hydrocarbons), or all of one and as much as the other as possible. The relative amounts of the fuel-air mixture and the exhaust gas-air mixture making up the stratified charge may be varied in response to accelerator position by auxiliary intake and exhaust timing valves, with a maximum quantity of fuel-air mixture and a minimum quantity of exhaust gas-air mixture being introduced at full engine load, and vice versa for minimum load. During deceleration the fuel-air mixture can be completely cut off until engine idling speed is reached, when a sufficient fuel-air mixture is again supplied. (Author abstract modified)

20341 APTIC NO. 39053

Naarding, Cornelis Jacobus

EXPERIENCE WITH NATURAL GAS FIRED TANKS FOR PRODUCTION OF CONTAINER WARE IN THE NETHERLANDS. *(Erfahrungen mit erdgasbeheizten Glasschmelzwannenoefen fuer Behaelterglas in Holland). Text in German. Glastech. Ber., 45(3):99-103, March 1972.*

Measurements are reported for two newly built natural gas-fired container glass tanks, one horseshoe-fired, and one cross-fired; the data relating to operating conditions as well as choice of fuel are also discussed. The optical characteristics of the flame are very different in the two furnaces. The horseshoe-fired tank has a weakly radiating flame but a highly luminous flame can be produced in the cross-fired tank. The data recorded concern primarily excess air, and quantity of combustion, heat balance for the melting process, and heat consumption/kg of glass. When producing 150t/24 hr, the specific heat consumption of the horseshoe-fired tank is 1300 kcal/kg of glass. The cross-fired tank showed a higher fuel consumption. The data demonstrate that natural gas fired furnaces can give very satisfactory results. The waste gas was analyzed with Orsat units and Servomex-O2-measuring units. The measurements revealed a good symmetrical shape of the flame at the combustion at both the left and the right burners.

Measurements of the carbon dioxide concentrations across the length of the flame yielded that the gas was completely burned after a maximum of 9 m. The waste gases left with temperatures between 340 to 360 C in the two types of furnaces.

20342 APTIC NO. 38751

Nagel, Ernst

GUIDE SEPARATOR HOUSING FOR SEPARATING AIR CHARGED WITH IMPURTIES. *(Luwa A. G., Zurich (Switzerland)) U. S. Pat. 3,618,303. 7p., Nov. 9, 1971. 10 refs. (Appl. Feb. 24, 1969, 6 claims).*

Am improved guide housing is described for conducting or transporting air which is charged or contaminated with impurities such as dust or fibers. The guide housing incorporates a housing body member with an approximately cylindrical or spiral shaped cross-section. In addition, the housing body member includes an inlet opening, a discharge opening, and a discharge stud or connection piece which communicates with the discharge opening and is tangentially directed with regard to the housing body member. This housing body member is provided with means for producing a spiral-or-spin-flow internally of the housing body member. The effective flow cross-sectional area of the discharge connecting piece is reduced to a fraction of the actual cross-sectional area to enable discharge of air and fiber accumulations even larger than the effective flow cross-sectional area. The invention relates to pneumatic installations for cleaning machines, for example, textile machines. (Author abstract modified)

20343 APTIC NO. 38786

Nagel, Otto, Herbert Kuerten, and Richard Sinn

MASS TRANSFER AREA AND ENERGY DISSIPATION DENSITY AS CRITERIA FOR CHOICE OF GAS/LIQUID REACTORS. (PART I: MASS TRANSFER AREA IN VARIOUS GAS/LIQUID REACTORS AS A FUNCTION OF THE OPERATING PARAMETERS). *(Stoffaustauschflaeche und Energiedissipationsdichte als Auswahlkriterin fuer Gas/Fluessigkeits-Reaktoren. Teil I: Die Stoffaustauschflaeche in verschiedenen Gas/Fluessigkeits- Reaktoren als Funktion der Betriebsparameter). Text in German. Chem. Ing. Tech., 44(6):367-373, 1972. 12 refs. (Presented at the Verfahrens-Ingenieure, Annual Meeting, Nuremberg, West Germany, Sept. 21-23, 1971.)*

In order to determine an engineering criterion to be used in the choice of the most suitable gas/liquid reactor or chemical scrubber, a model utilizing the cobalt-catalyzed oxidation of sodium sulfite in water solution by means of air was studied. The gas/liquid exchange surface is considered the main parameter to be investigated. Sulfite consumption under constant pH and temperature conditions were measured in bubble columns with and without discharge nozzle gasification, in stirring containers, in packed columns with unidirectional flow, in tubular reactor-discharge jets, and in venturi scrubbers. Consumed oxygen amounts allow computation of the specific exchange surfaces. Comparison of substance exchange surfaces attained for the same model within these reactor systems reveals their dependence upon the reactor type, its geometrical variations, and its operating parameters such as gas and liquid throughput and flow rates.

20344 APTIC NO. 39561

Nagel, Roland

VENTURI SCRUBBER DEVELOPMENT, FUNCTION AND ENERGY CONSUMPTION. *(Der Venturi-Waescher Entwicklung, Wirkungsweise und Engergiebedarf). Text in German. Staub, Reinhaltung Luft, 29(4):133-139, April 1969. 10 refs.*

The development of the venturi scrubber from 1900 and its mode of operation are described. A distinction is made between the impact effect, which mainly occurs in the throat during lateral injection and affects coarse particles, and the contact and diffusion effect, which occurs during axial injection and is the result of fine atomization. Power requirements are discussed. The scrubber is considered as a part of a pneumatic conveying plant, i.e., as an acceleration path at the feed point.

20345 APTIC NO. 38788

Nagel, S. and B. Thelen

PROGRAM FOR CALCULATIONS ON STEADY-STATE PLATE ABSORBERS WITH THE USUAL MASS AND HEAT TRANSFER CONDITIONS. *(Programm zur Berechnung stationaerer Bodenabsorber - unter Beruecksichtigung aller ueblichen Stoff- und Waermestromschaltungen). Text in German. Chem. Ing. Tech., 44(6):416-420, 1972. 5 refs. (Presented at the Verfahrens-Ingenieure, Annual Meeting, Nuremberg, West Germany, Sept. 21-23, 1971.)*

The steady state of absorber columns is computed utilizing the well-known mathematical model including enthalpy, mass, and phase equilibrium balance. The real state of the liquid phase is described by the Wilson equation. A plate efficiency coefficient is taken into account in the computation of mass transfer. Adiabatic and non-adiabatic processes can be treated. Lateral inlets and outlets (with and without column recycling) and heat exchangers located within the mass flow system are also taken into account. Applicability of the model is illustrated by an example of adiabatic methanol absorption from nitrogen with water. For optimizing absorption conditions, a tendency to keep the solvent quantity as low as possible is customary. The assumption of isothermicity of the process can thus easily lead to distortions. Precise computation of the most basic processes is essential to the design procedure because of the strict temperature dependence of gas solubility and vapor/liquid equilibrium conditions. The computation program described permits such calculations even for multi-compound systems.

20346 APTIC NO. 38900

Nakajima, Bin

DAMPER DEVICE FOR BAG FILTER. *(Baggu firuta no dampa sochi). Text in Japanese. 0(Babcock Hitachi Co., (Japan)) Japan. Pat. Sho 47-3956. 4p., Feb. 3, 1972. (Appl. March 26, 1969, 1 claim).*

This invention offers an innovated version of a damper provided in the air exit duct of a bag filter. The newly devised damper is designed to give itself oscillation at the time of opening and closing. This oscillation shakes dust accumulated on the surface of the damper and removes the dust so that the damper s sealing effect may be protected from possible deterioration with the accumulated dust. Filter bags which filter emission gases from a roasting furnace of an ironworks become clogged with iron oxide powder and other dusts, so that they must be cleared of the dust by shaking them mechanically from the outside from time to time. For this periodical cleaning, the exit duct damper of the bag filter must be closed for airtight sealing. If the sealing is not air-tight, the dust shake-off cleaning of the filter bags will be greatly hampered. And the dust adhering to the damper s surface causes the air-tight sealing to become poor. The damper s arm is loosely connected to a kind of L-shaped lever. The other end of the lever is loosely connected to the air cylinder so that the damper may be opened downward when the cylinder piston moves forward horizontally. A universal joint is used at the joint where the damper s arm is fitted to the damper proper in such a way that the above-mentioned oscillation may be automatically generated at the time of closing and opening.

20347 APTIC NO. 39062

Nalbantoff, Jordan

THE APPLICATION OF THE CYCLONE AS SEPARATOR FOR OIL AND RUST AEROSOLS FROM FLOWING COMPRESSED AIR. *(Anwendung des Zyklons als*

Abscheider von Oelschwebeteilchen und Flugrost aus stroemender Druckluft). Text in German. Wasser Luft Betrieb, 16(4):119-121, April 1972. 17 refs.

A modified centrifugal separator for cleaning flowing gases, primarily for oil separation from compressed air was developed. The exit tube which protrudes into the cyclone was helically shaped with a periodically changing cross section. This caused a periodical change of the flow speed and flow direction of the air. Even the finest particles are gathered on the corrugations of the exit tube. Through a suitable guiding device the collected particles are directly passed into the exit opening. Experiments have shown that the collection efficiency of this modified cyclone is superior to that of conventional cyclones. Through a sufficiently large number of screw threads the efficiency can be further increased.

20348 APTIC NO. 39559

Nelson, Harlan W. and Carl J. Lyons

SOURCES AND CONTROL OF SULFUR-BEARING POLLUTANTS. *J. Air Pollution Control Assoc., 7(3):187-193, Nov. 1957. 12 refs. (Presented at the Air Pollution Control Association, Annual Meeting 50th, St. Louis, Mo., June 2-6, 1957.)*

The principal sources of sulfur contaminants in the atmosphere are the combustion of coal; the production, refining, and utilization of petroleum and natural gas; industries making and using sulfuric acid; and the smelting and refining of ores, principally copper, lead, zinc, and nickel. Current control processes are described. For the removal of hydrogen sulfide from effluent gases, the catalytic conversion process and the Girbotol process are widely used for sour natural gas and refinery gases. Removal of sulfur dioxide from smelter gases can be accomplished by a refrigeration process to recover SO2 from roast gases and by chemical processes using aqueous ammonia or aromatic amines such as zylidine or sulfidine to absorb SO2. Sulfur dioxide can be removed from power plant gases by the Battersea process, the Howden/ICI cyclic lime process, or a zinc oxide regeneration process. None of the methods represents a final practical and economic answer to the problem of controlling sulfur emissions from stack gases.

20349 APTIC NO. 39285

Neumann, J. W.

PROCESS CONTROLS IN ARMCO S CLOSED HOOD (O.G.) B.O.F. SHOP AT MIDDLETOWN. *Instr. Metals Ind., vol. 21, 6p., 1971.*

An oxygen converter gas recovery system installed in a steel plant basic oxygen furnace shop was designed to allow combustion of 10% of the carbon monoxide being evolved at the peak of an oxygen blow. This was a safety factor in case hood pressure control could not prevent infiltration of outside air. However, if the skirt is seated properly on the lip of the vessel, and if the control hardware is in working order, virtually no air need be admitted into the system and virtually no off gas need be emitted to the outside. The system differs from a conventional open hood system in that the CO is not burned to carbon dioxide as it exits the mouth of the vessel, but instead is cooled, cleaned, and delivered as CO under positive pressure to a flare stack. The system provides for the eventual collection and storage of the 70-80% pure CO for use as a fuel or for chemical utilization. The control loops essential to the operation of the system are described. These include hood pressure control, fan static pressure control, and purge nitrogen control.

20350 APTIC NO. 38809

Nishida, Toyomi and Takeji Suzuki

HUMIDIFYING TEMPERATURE CONTROL DEVICE FOR ELECTROSTATIC PRECIPITATOR. *(Denki shujinki nado no zoshitsu koon sochi). Text in Japanese. (Kawasaki Heavy Industries, Co., Ltd., Kobe (Japan)) Japan. Pat. Sho 46-30558. 3p., Sept. 4, 1971. (Appl. Feb. 5, 1968, 1 claim).*

A relatively high-temperature exhaust gas containing a high concentration of dust is emitted during the manufacture of cement and other powdered products. Usually the dust is collected by a multicyclone or a bag filter, or more recently by an electrostatic precipitator. To obtain maximum efficiency from an electrostatic precipitator, the gas temperature must be lower than 150 C so that the individual electric resistance will be low without increasing the gas capacity of the collector. The purpose of the invention is to improve the mechanism of the stabilizer which is used to lower the temperature of the exhaust gas. The mechanism of the stabilizer is often impaired by the slurry formed from the mixture of dust and atomized mist. In the improved design a jacket is installed outside the hopper where slurry collects. Part of the high-temperature gas is led to the jacket and warms the hopper from outside. The slerry will be dried and the dust discharged from the rotary damper attached to the lower end of the hopper. The gas is then returned to the main body of the stabilizer.

20351 APTIC NO. 38729

Noboru, Kubota and Kirao Motoaki

EXHAUST EQUIPMENT FOR AN OXYGEN STEEL CONVERTER. *(Abgasanlage fuer Sauerstoff-Aufblaskonverter). Text in German. (Kawasaki Jukogyo K. K., Kobe (Japan)) W. Ger. Pat. 1,433,571. 5p., Feb. 18, 1971. 1 ref. (Appl. July 23, 1964, 3 claims).*

The design for an apparatus to recover unburned, cooled, and purified waste gases from an oxygen steel converter is presented. A hood over the converter, equipped with a centrifugal suction pump, draws gases through a cooler and dust separator. The exhaust of the pump leads to two valve controlled passages, one discharges to a stack and the other leads to a collector tube connected to a second suction device, on its pressure side, which feeds the collector tank at several hundred mm water column pressure. The gas from the converter is mixed with surrounding air and the carbon monoxide is further oxidized. Valves are controlled by pressure sensors connected to servomotors, so that drafts in the stack and in the collector tube are equalized. The design circumvents the pressure fluctuations of the waste gases within the hood, which are a disadvantage of other similar processes.

20352 APTIC NO. 38814

Noir, Dominique

AIR POLLUTION AND INTERNAL COMBUSTION ENGINES. *(Pollution de l air et moteurs a combustion). Text in French. Bull. Tech. Suisse Romande (Lausanne), 96(21):299-309, Oct. 17, 1970. 13 refs.*

The composition of internal combustion engine exhaust as determined by the fuel quality, by the air coefficient, and by the possibilities of abatement of air pollution from road vehicles are reviewed. Fuel vapor emissions can be controlled by providing complete tightness of the tank and by respecting certain fuel circulation design criteria such as reclaiming of carburetor emissions after engine stopping. Crankcase emission control can be achieved exclusively by recycling of its gases. Ideal combustion conditions may be achieved only with pure fuel; however, increase of its octane index or development of engines requiring a maximum of an octane index of 90 could achieve considerable exhaust abatement. Variation of aerodynamic and geometric features of the combustion chamber, and of the carburetion, injection, and ignition conditions could contribute to the combustion process control. Flue gas control could be achieved by using fresh air injection into the flue gas collector (referred to as manifold air oxidation) by catalytic oxidation of the unburned matter or by applying afterburners using copper or chromium catalysts. Diesel engine exhaust control could be achieved by avoiding engine overload, by clean maintenance by frequent tune-up of the injector, and by use of fuel additives. Reference is made to an organic derivative of manganese (methylcyclopentadienyl tricarbonyle) which reduces the amount of soot by 50-80%. Future application of gas turbines to road vehicles as a means of reducing air pollution from automotive traffic are discussed. Attached are a description of the sampling and measurement instruments for exhaust analysis along with excerpts of the French Legislation from 1969 concerning automotive vehicle control equipment.

20353 APTIC NO. 38887

Nozaki, Fumio, Masayuki Kobayashi, and Setsuko Yoshida

STRUCTURE OF THE SUPPORTED URANIUM OXIDE CATALYST AND CATALYTIC ACTIVITY FOR OXIDATION OF CARBON MONOXIDE. *(Tantaitsuki sanka uran shokubai no kozo to issanka tanso sanka kassei). Text in Japanese. Nippon Kagaku Kaishi (J. Chem. Soc. Japan), no. 1:26-33, Jan. 1972. 11 refs.*

The structure of the uranium oxide-alumina catalyst and the reaction for the catalytic oxidation of carbon monoxide were investigated. The oxidative activity of the catalyst supported on silica was remarkably low compared with the catalyst supported on alumina. The uranyl compound used as a starting material for the catalyst preparation hardly decomposed to uranium oxide. The reaction rates of CO oxidation by the alumina supported catalyst or the catalyst without a carrier was of the first order with CO pressure and of the zeroth order with oxygen pressure. The apparent activation energy was nearly equal to 25 kcal/mol for the alumina supported catalyst and 18 kcal/mol for the catalyst without a carrier. Reaction schemes were calculated for the catalyst reduction and oxidation steps; the reaction proceeds by oxidation-reduction cycles, with the reduction as the rate-determining process. In general, alumina and silica tended to combine with uranium oxide or urnayl compounds during the course of catalyst preparation. The active components were limited only to uranium oxide on alumina and uranium oxide-alumina compound.

20354 APTIC NO. 39044

Ohigashi, Shunichi, Hiroshi Kuroda, Yasuo Nakajima, Yoshimasa Hayashi, and Kunihiko Sugihara

PRACTICAL ANALYSIS OF EFFECT OF EXHAUST GAS RECIRCUALTION ON NOX EMISSION CONTROL. *(NOx haishutsu seigyo ni kansuru haiki kanryu koka no jitsuyoteki na kaiseki hoho ni tsuite). Text in Japanese. Jidosha Gijutsukai Ronbunshu (Proc. Soc. Automotive Engrs.), no. 2:16-21, July 1971. 4 refs.*

The effect of exhaust gas recirculation on nitrogen oxide emissions from internal combustion engines was examined. Exhaust gas recurculation decreases peak combustion temperature and thus reduces the concentration of NOx in the exhaust gas. The NOx formation was primarily affected by the heat capacity of the combustion gases and the recycled gas. Engine output and efficiency were also significantly affected by the heat capacity. Exhausts gas recirculation, therefore, functions by increasing the heat capacity of the working fluid; changes in NOx and engine performance can be predicted from heat capacity considerations.

20355 APTIC NO. 39567

Ohm, U.

ETHYLENE IN NATURAL GASES AND DRILLING MUD GASES. *(Athylen im Boden und Spuelungsgas). Text in German. Erodoel Kohle (Hamburg), 24(12):730-733, Dec. 1971. 16 refs.*

The occurrence of olefins under deposit conditions is mostly denied. In compendiums of organic chemistry their presence in crude oil is referred to in terms such as very minor quantities or small percentages, and exact sources are not indicated. Oil research, on principle, denies the occurrence of olefins in natural gas. The only exception known is an older paper which claims to have proved ethylene in Pechelbronn crude oil gas. The appearing of olefins in soil gases has often been observed. Concentrations, representations of distribution, and the relation to other hydrocarbons present in soil gas, however, have scarcely been published as yet. Some examples for the presence of ethylene in soil gases shall be given. Furthermore, the occurrence of ethylene in drilling mud gases of deep wells is reported on, and the question as to the primary or secondary occurrence of olefins in natural gas is again proposed for discussion.

20356 APTIC NO. 38938

Okamura, Saburo

EXHAUST GAS CLEANER/SILENCER. *(Haikigasu no shoon o kaneta joka sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-5861. 4p., Feb. 19, 1972. (Appl. Sept. 18, 1969, 2 claims).*

A catalyst type automotive exhaust gas cleaner also serving as a silencer consists of several spherical units connected in series to one another and connected in series to the exhaust pipe. Each spherical unit is made up of two cup-shaped halves. Each cup has a flanged edge so that two of the cups can be assembled easily to make one spherical unit sealed air-tight by means of bolts and nuts. A conical stainless steel disperser plate is installed inside of the cup constituting the front half of the spherical unit so that its pinnacle may be located at the horizontal axis of the gas intake pipe. Two concentric tubes made of stainless wire nettings are installed horizontally after the disperser plate. The outer tube, naturally larger than the inner tube, should be smaller in diameter than the disperser plate. The front ends of both tubes are fixed onto the inner surface of the disperser plate. The rear end of the outer tube is fixed onto the inner surface of the rear-half cup, while the inner tube goes through the joint of two spherical units into the next spherical unit. Granular catalyst fills the space between the two tubes. As the exhaust gas is taken into the first spherical unit, it is dispersed by the disperser plate and effectively diffused in the unit, thereafter flowing into the catalyst layer held between the two tubes to finally enter the inside of the inner tube. It then flows on into the next spherical unit where the same cleaning/ silencing process will be repeated. This goes on until the last spherical unit. For more effective cleaning, two kinds of catalyst may be used instead of one; the gamma alumina catalyst in the first one or two spherical units and the catalyst made of a mixture of platinum black and rhodium in the following units.

20357 APTIC NO. 39597

Olson, W. T.

CONDITIONING FLYASH TO IMPROVE ELECTROSTATIC PRECIPITATOR PERFORMANCE. *Power Eng., 76(4):38-39, April 1972.*

Boilers fired with low sulfur content coal produce a resistive fly ash that is generally difficult to remove with electrostatic precipitators located conventionally after the preheater. However, this difficulty can be overcome by introducing about 20 ppm of sulfur trioxide or sulfuric acid vaporized into the flue gas before it enters the precipitator. The acidic material is adsorbed on the ash particles and produces an electrically conductive surface condition. Factors which influence particle resistivity are cited, and flue gas conditioning is discussed.

20358 APTIC NO. 39028

Orihara, Shizuo

DIFFUSION METHOD FOR POLLUTED AIR. *(Osen Taiki no Kakusanho). Text in Japanese. (Tokyo Rope Mfg. Co., Ltd. (Japan)) (Japan. Pat. Sho 46-37620. 2p. Nov. 5, 1971. (Appl July 17, 1969, 1 claim).*

Based on the knowledge that smog takes place chiefly over municipal areas when the inversion layer of warm air whose upper limit is about 300 m from ground level exists above a layer of cold air whose lowest limit is about 50 m from ground level, a method has been developed in which a long flexible duct will be suspended upright in the atmosphere by balloons so that the cold air layer below the inversion layer of warm air may be connected with another cold air layer above the inversion layer to accelerate atmospheric diffusion of the polluted air. The long flexible duct, 50 m in diameter and 250 m or more in length, is made of nettings covered with systhetic resin film. It is suspended in the atmosphere by a few balloons in such a way that its upper end may open in the cold air layer above the inversion layer or about 300 m from ground level and its lower end may open in the cold air layer below the inversion layer or about 50 m or lower from ground level. The respective heights will be determined on the basis of actual meteorological conditions. Air below the duct is then heated. The heated polluted air ascends to go through the duct and reach the higher cold air layer in which it effectively diffuses. As the polluted air immediately below the duct keeps on ascending, other portions of the air around move in and rise through the duct. This continues until the polluted layer of air in the lower altitude is sufficiently diffused through the duct into the higher cold layer of air.

20359 APTIC NO. 39596

Overend, Miles

HILL STACK DISPERSAL TO BEAT INVERSIONS. *Water Pollution Control (Toronto), 110(4):76, 78, April 1972.*

Weyerhaeuser Canada Ltd. is building a new pulp mill on the banks of the Thompson River in Kamloops, British Columbia, at a cost of about $110 million, of which more than $22 million will be spent on direct and indirect pollution control measures. Incorporated in the far-reaching environmental protection plan will be a new super stack up the side of a mountain, costing $6,465,000, which is expected to lead flue emissions above the inversion level. The biggest item in the water protection department will be the new 75-acre effluent lagoon, which will provide a five-day retention period for mill effluent before it is discharged. Included in the water treatment facilities will be two settling ponds, a clarifiers, and a large emergency dump pond, where spills can be released. Other water protection devices are mentioned, and provision for the high level stack discharge is described.

20360 APTIC NO. 39166

Patterson, Donald J. and Robert H. Kadlec

THERMAL REACTORS WORK BETTER WITH CORRECT AIR INTAKE. *Automotive Eng., 80(2):26-29, Feb. 1972. 1 ref. (Presented at the Coordinating Research Council Automotive Air Pollution Research Symposium, Chicago, Ill., May 3-5, 1971; and the American Institute of Chemical Engineers National Meeting, Cincinnati, Ohio, May 16-19, 1971.)*

Certain chemical and physical factors that govern thermal reactor performance within the context of automotive emission control are examined. The air-injection fraction affects reactor performance very much; good oxidation of hydrocarbons and carbon monoxide occurs between 0.15-0.40. When the air-injection fraction is not at the optimum point, olefins and aldehydes increase markedly. The operating efficiency of a reactor at a particular point, e.g., idle, depends on whether or not the engine had previously run hard. Less than perfect mixing occurs under warmed-up steady-state conditions. (Author abstract modified)

20361 APTIC NO. 39662

Payne, Earl C.

RAILROAD ACTIVITY IN REDUCING ATMOSPHERIC POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 415-421. (May 3-5, Louis C. McCabe, ed.)*

The job of reducing the smoke and fly ash emitted by steam locomotives was jointly undertaken by the coal industry and the railroads. Railroads are encouraged to install modern combustion equipment that is designed and installed for the utilization flexibility that will permit use of the complete range of fuels tha will probably be available in each locality for the life expectancy of the equipment. The coal industry is required to apply tailor-made sizes and grades that will give the optimum use value with such equipment, and modest changes or modernization of present equipment can be justified to widen the fuel selection and improve cost. The coal application method reducing smoke and cinder emission is emphasized. A cinder collection and ash disposal system is being tested. Most of the railroads are using some form of straight steam or air inducing jet installed in the firebox as smoke consumers.

20362 APTIC NO. 39037

Polyakov, Yu. A., I. L. Reznikov, and Yu. A. Korotkov

TECHNOLOGY OF RENDERING HARMLESS AND UTILIZING CHLORINE- CONTAINING WASTE GASES. *(Tekhnologiya obezvrezhivaniya i utilizatsii otbrosnykh khlorsoderzhashchikh gazov). Text in Russian. Tsvetn. Metal., 44(9):38-39, 1971. 8 refs.*

Chlorine gas emitted from electrolytic magnesium cells and chlorination apparatus (3-60 g/l) was added to the fuel gas burners in carnallite dehydration furnaces. This reduced the cost of waste gas treatment and fuel and prevented the hydrolysis of magnesium chloride. The reaction of CL with flame components was complete even at large excess air coefficients (alpha). A cylindrical combustion chamber is described in which carbon monoxide was not detected even at an alpha value of 6.8. Reynolds number, alpha, and fuel gas consumption are given at 592-899 deg. Increasing the temperature markedly improved CL assimilation. The assimilation was almost independent of gas turbulence at 900-1000 deg, markedly dependent at lower temperatures, and almost completely dependent at 600-700 deg and strong turbulence. The combustion method was suitable for treating other gases containing chlorine and its toxic compounds such as phosgene.

20363 APTIC NO. 38832

Pustovit, Yu. A., V. M. Kirillin, T. V. Shinkareva, and G. Ye. Borodina

AN ANALYSIS OF TECHNICAL PROCEDURES TO BE APPLIED FOR THE EXTRACTION OF AMMONIA AND ACID COMPONENTS FROM COKE GAS. *(Analiz tekhnicheskikh razrabotok po izvelecheniyu ammiaka i kislykh komponentov iz koksovogo gaza). Text in Russian. Koks i Khim., no. 1:44-48, Jan. 1972. 8 refs.*

The basic trends in the field of the extraction of ammonia and acid components from coke gas are outlined on the basis of an analysis of related inventions and technical solutions in the U. S., USSR, Great Britain, and the German Federal Republic during 1950-1967. In the next 5-10 yrs, ammonia from coke gas will be utilized in fertilizer production, and the technology used in manufacturing ammonium sulfate will be further developed to obtain macrocrystalline and granulated products. The importance of processes for the extraction of acid components is confirmed by the increasing number of related new methods and apparatus. More than 550 patents relating to the extraction of ammonia water, free ammonia and acid components such as hydrogen sulfide, the production of ammonium sulfate, and extraction equipment have been registered in the four countries during 1950-1967. Nitric oxide present in coke gas can be removed by means of ultraviolet rays on catalysts in the presence of unsaturated compounds.

20364 APTIC NO. 39214

Quebedeaux, W. A., Jr.

NEW APPLICATION FOR INDUSTRIAL ODOR CONTROL. *J. Air Pollution Control Assoc., 4(3):141-142, 170-171, Nov. 1954.*

Factors related to industrial odor control include the presence of carriers, whether the process is continuous or not, dilution of the odor produced, employee odor consciousness, physiologic effects, cost, physical state, and background odor. Novel uses of masking agents and odor counteractants and their roles in the solution of odor problems are considered. In application of these materials, space spraying procedures are most useful. Overall plant odor abatement is accomplished by applying the material at sufficient locations so that it enters and mixes with the odors in all the air strata in which they travel. Proper abatement is accomplished when better than 90% coverage is obtained even under the most severe conditions of adverse weather.

20365 APTIC NO. 39039

Racine, W. J.

PLANT DESIGNED TO PROTECT THE ENVIRONOMENT. *Hydrocarbon Process., 51(3):115-119, March 1972. 8 refs. (Presented at the Western Gas Processors and Oil Refiners Association, Universal City, Calif., Oct. 7, 1971.)*

The hydrogen refining processes and advanced air and water conservation equipment installed at a new Washington State refinery are described. Extensive pre-startup surveys and monitoring programs are underway, and operating technicians are being drilled in the importance of conservation. Hydrogen sulfide and other sulfur compounds are recovered from the sour gas streams via the diethanolamine absorption process. Equipment to control particulate emissions includes excess oxygen analyzers on all stacks of fired vessels rated in excess of 100 MM Btu/hr and steam injection on all emergency flares for smokeless operation. Floating roof tanks, mechanical seals, and smokeless flares are utilized to control hydrocarbon and odorous material emissions. Water conservation is accomplished through a minimum use of fresh water, source control, and multi-system treatment. Diffusion data, weather data, and an analysis of the vegetation, soil, and water in the area are being investigated.

20366 APTIC NO. 39217

Reedy, D. E.

CATALYTIC OXIDATION OF ODORS. *Missouri Univ., Columbia, Coll. of Engineering and Missouri Air Conservation Commission, Jefferson City, Control Dusts, Smokes, Noxious Odors, Proc Annu. Air Pollut. Conf., 3rd, Columbia, Mo., 1970, p. II-19. 2 refs. (Nov. 17.)*

Catalytic oxidation can be effectively applied to the destruction of odors in almost all cases where combustible gases are invloved. The oxidation catalysts most commonly used for air pollution control consist of precious metals such as platinum and palladium electroplated on a metallic ribbon carrier or impregnated onto an alumina-ceramic support. Both process and mechanical considerations are important in the design of a catalytic incinerator for odor control. For a given catalyst, process performance is determined by time, temperature, and turbulence. One factor frequently overlooked in catalytic process design is the effect of aging on catalyst activity. Catalytic oxidation is more ecomonic than thermal incineration and more flexible, generally, than other odor control techniques. However, odorous catalyst poisons and inhibitors must be avoided.

20367 APTIC NO. 39218

Regehr, Ulrich

SEPARATION OF DROPLETS FROM GAS FLOWS. *(Avskiljning av droppar fran strommande gaser). Kem. Tidskr., 81(5):22-25, 1969. Translated from Swedish by Lennart Janghahn. 8p.*

Liquid droplets can be separated from gases by gravity, inertia, diffusion, and electrostatic forces. Droplet separators designed on the principle of mass inertia comprise a flow lattice which divides the gas flow into several sub-flows. Due to the profile of the flow lattice, the gas flow is deflected from its original flow path and, because of the influence of mass inertia, a relative movement between droplets and gas develops. Equations and dimensioning of the droplet-separator are presented, as well as several different types of separator.

20368 APTIC NO. 39735

Renwanz, Roger A. and Schaeffer E. Specht

SURVEY OF SMOKE CONTROL. PART I. *Steel. 135(21):100, 102, 116, Nov. 22, 1954. Part II. Ibid., 135(22):76-78, Nov. 29, 1954.*

The steel industry is second only to the power industry in the total cfm of gas cleaned with Cottrell precipitators built by the Research Corp., Bound Brook, N. J.; steel is leading in the rate of new installations. Hot scarfing machines, open-hearth and electric furnaces, sintering machines, and iron cupolas are recent recruits in the precipitator fold. One new use of precipitator gas cleaning equipment is found at the Duquesne Works of the United States Steel Corp., where five electrostatic precipitators are installed for cleaning gas from ferromanganese blast furnaces. These precipitators are equipped with the new magnetic impulse rapping system to prevent smoke to prevent smoke from escaping to the atmosphere during precipitator cleaning. Operation principles of these pricipitators are indicated. Precipitators are routine in several jobs such as detarring coke oven gas and secondary cleaning of blast furnace gas.

20369 APTIC NO. 39736

Renwanz, Roger A. and Schaeffer E. Specht

SURVEY OF SMOKE CONTROL. PART II. Steel, 135(22):76-78, Nov. 29, 1954. Part I. Ibid., 135(21):100, 102, 116, Nov. 22, 1954.

One of the important new uses of electrical precipitators is the cleaning of open-hearth gases. The Torrance Works of Columbia- Geneva Steel has a standard steel collecting plate, horizontal flow fly ash type precipitator, which represents the most common type installation in use. A waste heat boiler of about 10,000 lb hr capacity and an induced draft fan serve each furnace. Plate rappers are of the magnetic impulse continuous operating type, and the high-tension rappers are pneumatic vibrators operating on a time cycle. The installation incorporated what might be termed a unit system principle: a separate precipitator was provided for each open hearth. While such an arrangement is satisfactory, studies indicate it might be desirable in terms of cost and operation to combine gases from a number of furnaces and treat them in a central cleaning plant. The first precipitator used for the recovery of dust from the combustion gases from iron ore sintering machines was placed in operation about two years ago at the Wenonah Works, Tennessee Coal and Iron Division, U. S. Steel Corp. The application and operation of this installation are discussed.

20370 APTIC NO. 39658

Resen, Larry

HUMBLE ATTACKS POLLUTION AT BAYTOWN. PART I. *Oil Gas J., 57(41):176-181, Oct. 5, 1959.*

The control of air and water pollution at a refinery with a crude- oil-charge capacity of 283,900 bbl/day is discussed. Major processing facilities include five two-stage pipe stills, one propane deasphalter, three fluid catalytic cracking units, two platinum-catalyst reforming units, two liquid sulfur dioxide extraction units, one catalytic polymerization unit, one alkylation plant, several hydrogen-treating units, and several light-end units. Contamination is prevented by attacking the source, improved processes, installation of special equipment, and affixing responsibility. The effluent control program is described. A collection system was installed to route all process waters containing hydrogen sulfide to a sour-water stripping unit. The water is first acidified to a pH of 4.0 and then stripped with natural gas in a packed tower. This removes 99% of the hydrogen sulfide present in the incoming stream.

20371 APTIC NO. 39601

Revell, Alan E.

MOUNTING SUPPORT FOR ELECTRICAL DISCHARGE WIRES TO BE PLACED BETWEEN THE PLATE ELECTRODES OF AN ELECTROSTATIC SEPARATOR. *(Halterung fuer zwischen Plattenelektroden angeordnete Spruehdraehte von Elektoabscheidern). Text in German. (American Air Filter Co., Inc., Louisville, Ky.) W. Ger. Pat. Appl. 1,457,255. 3p., Dec. 12, 1968. 6 refs. (3 claims).*

A design for an electrostatic dust precipitator with double spring mounted corona wires is presented. The corona wires in the precipitator corona zone are tensioned so that they are parallel to and between the plate electrodes by looping them over the pointed hooked ends of flat strip, tapered springs, whose wider feet are anchored in slots in longitudinal cross bars of the U section. When the wires are hooked on, the springs become quarter-elliptic in shape. The assembly method is simple, cheap, and stable.

20372 APTIC NO. 39702

Richardson, H. L.

THE ROLE OF ELECTRICAL PRECIPITATION IN THE STEEL INDUSTRY. *Iron Steel Engr., 30(10):95-100, Oct. 1953.*

The principles of operation of a Cottrell electric precipitator and the equipment used are described, and the major applications in the steel industry are discussed. For the removal of suspended materials adversely affecting the use of gases for industrial purposes, these applications include detarring of by-product coke oven gas, cleaning of oven fuel gas, and secondary cleaning of iron blast furnace gas. It is anticipated that ferromanganese furnace gases will also be effectively cleaned by precipitators. For cleaning waste gases to prevent air pollution, major applications included gases from open hearth furnaces, iron cupolas, and iron ore sintering machines. Potential application to scarfing machines and electric furnaces is noted.

20373 APTIC NO. 38912

Richarz, W. and A. M. Samsam Bakhtiari

TWO-DIMENSIONAL, TWO-PHASE MODEL FOR HETEROGENEOUS FIXED BED REACTORS. *(Zweidimensionales Zweiphasenmodell fuer heterogene Festbettreaktoren). Text in German. Chem. Ing. Tech., 44(6):388- 391, 1972.*

A new method is described for the combination of granular microkinetics of a catalytic reaction, determined in a differential reactor, with a two-dimensional model of a fixed bed reactor in the steady state. The partial pressure drop of the reacting component and the increase in temperature (in an exothermic reaction) in the boundary layer surrounding the catalyst are determined at each integration step, and the partial pressure and temperature profiles in the catalyst itself are subsequently determined by an iterative procedure. Data thus calculated are in much better agreement with the longitudinal profiles measured in an integral reactor than the values determined with a quasi-homogeneous two-dimensional model.

20374 APTIC NO. 39206

Roberts, L. M., C. E. Beaver, and W. H. Blessing

OPERATING EXPERIENCES WITH COTTRELL PRECIPITATORS ON SULPHATE RECOVERY FURNACE GASES. *Paper Trade J., 127(18):45-49, Oct. 28, 1948. (Presented at the Alkaline Pulping Committee, Technical Association of the Pulp and Paper Industry, Asheville, N. C., Oct. 11, 1947.)*

Operating data and plant experience with Cottrell precipitators for recovery of sodium compounds from sulfate mill recovery furnace gases are presented. The data, which apply to 38 precipitators in 16 installations, cover pulp tonnage, operating temperatures, amount of precipitate, dust analyses, operating availability, and maintenance and labor costs (1968). In general, the precipitators show recoveries of 88-145 lbs/ton of pulp, the average being 118 lbs. Based on the average rate and a precipitator availability of 95%, the yearly return from a 250-ton mill operating 350 days/yr would be 4900 tons.

20375 APTIC NO. 39293

Rowe, Norman R.

ODOR CONTROL WITH ACTIVATED CHARCOAL. *J. Air Pollution Control Assoc., 13(4):150-153, April 1963. (Presented at the Air Pollution Control Association, Annual Meeting, 55th, Chicago, Ill., May 20-24, 1962.)*

Organic vapors are a major source of atmospheric pollution, but most such vapors, including industrial solvents, vent gases, and process fumes can be eliminated and in many cases recovered for sale or reuse by adsoption in activated charcoal. The type of activated charcoal odor control system to use depends upon how the odor is released, the arrangement of the exhaust system, and similar factors. Rate of odor release is a factor in determining the activated charcoal required. To be effective in any given situation, the odors must reach the charcoal by some means so that they can be adsorbed, and this is a function of the type of exhaust or air-intake system, placement of the activated charcoal, and related factors, Everything else being equal, service life and resistance are proportional to the thickness of the activated charcoal bed. Odor determination techniques are described.

20376 APTIC NO. 39451

Ruff, R. J.

CATALYTIC FUME ELIMINATION. DESIGN CONSIDERATIONS FOR APPLICATION. *Am. Ind. Hyg. Assoc. Quart., 14(3):183-187, Sept. 1953. 7 refs. (Presented at the American Industrial Hygiene Association Annual Meeting, 14th, Los Angeles, Calif., April 23, 1953.)*

Catalytic oxidation is broadly applicable to hydrocarbon and organic fumes, including alcohols, esters, ketones, ethers, acrolein, and aldehydes, as well as hydrogen, carbon monoxide, and mercaptans. From the standpoint of initial cost, there are no serious volumetric limitations on catalytic combustion systems. Because of the requirements for preheating to catalytic ignition temperature, operating costs increase directly with volume but inversely with fume energy concentrations. The limits of adaptability from the standpoint of energy concentration or continuity of fume load are again primarily economic. Where fume energy concentration is constantly within the flammable range, direct ignition by flame, without use of catalysts, is the more logical procedure. Expected catalytic combustion efficiencies in full-scale installations vary from 97.5% for fume energy concentrations of one Btu/Scf to higher for higher fume concentrations. Design requirements are now standardized for wire-enameling and kettle cooking applications. Other installations, such as core-baking ovens, ceramic kilns, phenolic resin curing ovens, and printing-press dryers, will require individual engineering study and design.

20377 APTIC NO. 38775

Ryaguzov, V. N. and I. V. Kaydalov

EFFECT OF THE METHOD OF STOPPING THE ANODE EFFECT ON THE POLLUTION OF THE ATMOSPHERE WITH FLUORINE. *(Vliyaniye sposoba grsheniya anodnogo effekta na stepen zagryazneniya atmosfery ftorom). Text in Russian. Tsvetn. Metal., 44(8):26-28, Dec. 27, 1971. 6 refs.*

Fluorine salt losses and abatement of air pollution with fluorine from aluminum producing plants can be achieved by substituting the use of wood pulp or other hydrogen containing compounds with compressed air in the extinguishing of the anodic effects. However, the wide use of this procedure was prevented because of the explosion hazards involved, if the air included humidity drops. An air drying device should be applied before its use for this purpose. Since each hydrogen atom introduced into the electrolyte system produces an emission of one fluorine atom, and the carbon constituent of the wood pulp produces contamination of the electrolyte and thus increases its electrical resistance, the advantage of the compressed air use is emphasized.

20378 APTIC NO. 38780

Sai, Tsuneo

JET FAN VENTILATION AND EFFECTS ON ROAD TUNNELS. *(Doro tonneru no jetto fan kanki to koka). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 59-62, Feb. 1972. (Presented at the Japan Society Civil Engineers, Tohoku Branch Meeting, Sendai, Japan, Feb. 22, 1972.)*

Among the various ventilation methods used for road tunnels, the jet fan ventilation attracts attention from the standpoint of its adaptability and economy. There are many already in use. Up to now, it has been utilized in 1000 m long tunnels. However, its first use for a 1300 m tunnel was made at the Toyasaka Tunnel (Kamaishi City, Iwate Prefecture) on Route 45. Its operation produced a good result. After a survey, it was concluded that the jet fan ventilation could be used for 1500 m tunnels in the future. But shortcomings were also found. During the night and depending on the geological circumstance of the tunnel, the ventilation noise is a limiting factor. The polluted air around both ends of the tunnel can become a problem. Also, at times, it might become only possible to have the air controlled in one direction. In the case of longer tunnels, the dispersing air near the ends of the tunnel can become extremely dense, especially because of the existence of vertical currents. There is a need for further research in order to clarify when to begin its operation, and how much operation is needed, in view of the health and comfort of the tunnel users within cost limitations. The study of fire prevention, especially regarding how to control the fan ventilation and how to evacuate the public in case of fire, is urgently needed. Operating variables, tables, and graphs are presented.

20379 APTIC NO. 39080

Saito, Hiroshi

IONIZATION AND DUST-ARRESTING ELECTRODE FOR ELECTRIC DUST REMOVER. *(Denki shujinki yo no denri oyobi shujin denkyoku). Text in Japanese. (Nippon Ariko Co., Ltd. (Japan)) Japan. Pat. Sho 47-1514. 3p., Jan. 19, 1972. (Appl. Oct. 11, 1968, 1 claim).*

The ionization/dust-arresting electrode is of a negative strip of corrugated plate and a positive single-core shielded wire rolled up together. The positively shielded wire should be inside of the negative strip of plate and rolled up with the plate. The negative strip of plate should be sufficiently corrugated to allow air or gas to pass easily through open spaces formed between each two windings when rolled together with the positive wire. The core wire of the positive wire must be shielded with a highly insulating material such as polyethylene or a similar synthetic resin that gives a high dielectric constant. A few or several of these electric filters are installed across the dust-collecting duct of an electric dust remover, each filter properly spaced from another. As air taken into the duct passes through the first filter, the air becomes ionized with its dust of larger grain size charged positive. The large-size dust is thus removed. The air containing finer dust becomes further charged electrically as it passes through the second filter, where the finer dust is removed. Similar processes go on for more complete cleaning as the air passes through each of the subsequent filters. The rear portion of the dust-collecting duct is a metal duct which is charged positively and in which a negatively-charged bullet-like electrode and an air suction fan are installed. The air sucked in by the fan and cleaned by the filters is now cleaned at this final stage where fine dust still unremoved is adsorbed to the inner surface of the metal duct, after which the cleaned air is discharged from the dust remover.

20380 APTIC NO. 38722

Saloojo, K. C.

CONTROL OF NITROGEN OXIDE EMISSIONS FROM COMBUSTION SOURCES: PART I: STATIONARY COMBUSTION SOURCES. *J. Fuel Heat Technol., 18(1): 2-6, Jan. 1972. 37 refs. (Presented at the International Flame Research Foundation, Flame Chemistry Panel, Ijmuiden, Netherlands, May 1971.)*

Major developments in the control of nitrogen oxide emissions from stationary combustion sources are reviewed. Basic considerations in the formation of nitric oxide are considered, as well as the influence of fuel factors in the formation of NOx. Combustion control techniques primarily act by influencing flame temperature, fuel-to-air ratio, and reaction time. Modifications of operating conditions may be classified as low excess air firing, two-stage combustion, off-stoichiometric combustion, flue gas recirculation, and steam and water injection. Design modifications may be classified as burner configuration, burner location and spacing, and fluidized bed combustion. Major flue gas treatment techniques are catalytic treatment, chemical absorption, and physical separation. The different techniques are individually assessed.

20381 APTIC NO. 39230

Sanctis, G. De

THE SOLUTION OF ATMOSPHERIC POLLUTION PROBLEMS OF A MODERN OIL REFINERY. *(I problemi degli inquinamenti atmosferici e la loro soluzione in una raffineria moderna). Text in Italian. Riv. Combust. (Milan), 10(6):443-455, 1956. (Presented at the Societa Chimica Italiana, Milan, Italy, March 21-22, 1956.)*

Oil refinery emissions include malodorous sulfur compounds; flare gas, a mixture of hydrogen, methane, propane or butane, and predominantly hydrogen sulfide from the purification of gasolines and of liquefied gas; and gases and fumes from catalyst regeneration. Control measures at a refinery in Milan provide for all liquid effluents from distillation units and from catalytic cracking units to be cooled in a single collector by heat exchangers, and deodorized in a stripping column by the application of steam and by the subsequent combustion of volatile malodorous components. The deodorized effluents are neutralized before being discharged. Liquid waste from chemical treatment is collected, neutralized, aerated, and dissolved; the gas thus liberated is burned together with the flare gases. A 500 cu m tank was built where all effluents are decanted and homogenized before actual treatment. Kerosene and other fractions that had been chemically treated with sulfuric acid, causing substantial SO2 emissions, are now treated successfully with copper chloride, which oxidizes mercaptans to stable and unobjectionable bisulfates. Spent soda solutions are regenerated by continuous electrolysis, eliminating complicated treatment by neutralization. All gaseous effluents are washed with soda and dietholamine, thus completely eliminating hydrogen sulfide. This innovation replaces the previous combustion of flare gases which burned the H2S to SO2 which was then dispersed in the atmosphere. Gases containing SO2 from regeneration of the catalyst used in the thermal catalytic cracking unit are now completely burned in the kiln by supplying supplemental hot air to the furnace.

20382 APTIC NO. 38877

Sarnes, Reiner

MOLECULAR SIEVE EQUIPMENT FOR MANUFACTURE AND CLEANING OF PROTECTIVE GASES. *(Molekularsieb-Anlagen zum Erzeugen und Reinigen von Schutzgasen). Text in German. Blech, 19(2):65-68, Feb. 1972.*

Protective gases are used for those heat treatment processes of steel and non-ferrous metals where oxidation has to be avoided. The gases are produced mainly by controlled combustion of gaseous hydrocarbons such as natural gas at a predetermined ratio of gas to combustion air, whereby operation with air deficiency to provide for incomplete combustion. After leaving the combustion chamber the gas is subjected to intense cooling and is then led through a system for removal of carbon dioxide and water. In its modern form this is a molecular sieve system, using as its filter substance a porous granular material similar to silica gel which is particularly suitable for adsorbing CO2 and H20 on its surface. When the adsorption saturation point has been reached, the filter bed has to be regenerated by desorption of the accumulate compounds. This is achieved by raising the temperature of the molecular filter by means of a heated inert gas of about 300 C which is forced through the filter in a direction opposite to the flow of the protective gas being produced. The filter bed then has to be cooled, with the cooling medium being made to flow in a direction opposite to that of the heating gas.

20383 APTIC NO. 39588

Satori, Hideo, Hideo Kubo, Mikio Kiyotomo, Setsuji Kokubo, and Haruo Uchiyama

STUDIES ON THE OPTIMUM ARRANGEMENT OF GUIDE VANES AT THE GAS INLET OF ELECTROSTATIC PRECIPITATORS. - 3RD REPORT. APPLICATION TO PRACTICAL DESIGN. *(Denki shujinki iriguchi annaiyoku saiteki haichi ni kansuru kenkyu-daisanpo jikki e no tekiyo). Text in Japanese. Ishikawajima Harima Giho (Ishikawajima-Harima Eng. Rev.), 12(1):39-45, Jan. 1972. 3 refs.*

A method for effecting an optimum arrangement of the inlet guide vanes of electrostatic precipitators was developed to obtain uniform flow in the electrode section and enable economical design. The method was then applied to the practical design of electrostatic precipitators, and flow distribution was measured at the site. Fairly uniform distribution was obtained without any modification of the guide vanes; desired distribution could be obtained with only slight modification. Based on the obtained flow distribution, collection efficiency could also be determined.

20384 APTIC NO. 39196

Scharfenberg, Curt

EXPERIMENTAL PREPARATION OF SULFUR FROM SULFUR DIOXIDE BY MEANS OF HYDROGEN. *(Versuche zur Gewinnung von Schwefel aus Schwefeldioxyd mittels Wasserstoff). Text in German. I. G. Farbenindustrie A. G., Ludwigshafen (West Germany), Dept. of Inorganic Chemistry, PB Rept. 73552, 12p., Sept. 27, 1940. 4 refs.*

Experiments initially conducted on a laboratory scale, then continued on a pilot plant scale are described. The reduction of sulfur dioxide with hydrogen was accomplished in a contact furnace made of vanadium steel at 600-700 C with bauxite of Indian origin as a catalyst. The furnace was filled with 9.8 l contact mass which reduced 800-4000 l/hr of the gas mixture. From the contact furnace the gases passed through two towers filled with 1/3 charcoal and 2/3 activated carbon where the hydrogen sulfide present reacted at 150 C quantitatively with SO2 yielding sulfur. Two-thirds of the sulfur was obtained in the catalytic furnace, 1/3 in the towers. From the towers, the gases passed through a cooling installation and a separator. The gas composition was 66% H2 and 34% SO2. The loss of SO2 in the process amounts to 1.8 g SO2/Mol S, but this SO2 dissolves in the condensate and can be returned to the process. The sulfur has a tendency to clog up the coal towers and presents a problem. The experimental run could not be completed because of severe corrosion, which terminated the experiment after 2 mo of operation. The sulfur obtained was 99.8% pure, and the waste gas from the process was free of H2 and H2S. The reaction temperature of 600 C could not be maintained from the exothermic reaction alone; some zones of the contact reactor required additional heating, other zones had to be cooled.

20385 APTIC NO. 38735

Schingnitz, Manfred, Manfred Gross, and Friedrich Berger

ABSORBENTS FOR PURIFYING GASES BY REMOVING CARBON DIOXIDE AND (OR) HYDROGEN SULFIDE. *(Gasreinigungsverfahren zur Entfernung von Kohlendioxid und/oder Schwefelwasserstoff). Text in German. (VEB Gaskombinat Schwarze Pumpe (East Germany)) W. Ger. Pat. Appl. 2,113,898. 7p., March 23, 1971. (5 claims).*

A process for total acid gas removal from natural, sewer, and synthetic gases is presented. The technique consists of counter-current absorption of the acid gas in aqueous solutions containing triethanolamine and mono-or diethamolamine to be carried out at 80 deg at atmospheric or increased pressure; the gas is desorbed with an inert stripping gas. An activator, e.g., amino acetic acid, diethylamine acetic acid, or weak inorganic acids, may be added, along with 0.05-0.5% potassium nitrite and potassium silicate or some other compound to inhibit corrosion. An antifoaming agent on a silicon base is added to the lye. An absorbent of such composition has a high reaction rate.

20386 APTIC NO. 39084

Scholze, S.

DEVELOPMENT AND TESTING OF ADDITIVES. *(Entwicklung und Auspruefung von Additives). Text in German. Freiberger Forschungsh. A, no. 503:69-79, 1972. 5 refs.*

A combustion promoting and sludge-sedimentation-preventing additive was prepared in a 3.5 cu m reactor from 0.5 ton acid resin/charge. This resin was extracted at 100 to 130 C for 30 min with a mixture of about 1.2 tons neutral oil and 0.3 tons of a pyridine base with a high boiling point in the presence of nitrogen. The acid extract was neutralized with an aqueous suspension of Buna-lime in the presence of nitrogen. The additive obtained by this method had sedimentation-preventing and corrosion-inhibiting properties. For achievment of combustion promoting properties, the product from the reaction of 0.66 tons of high-boiling pyridine bases with 0.112 tons of copper sulfate at 140 C was added at a ratio of 1 to 5 or 1 to 6. A total of 18 tons of additive from 11 charges extract and a copper concentrate were prepared. The influence of this additive on the sulfur dioxide/sulfur trioxide concentration in the waste air of a fuel oil-fired power plant was tested. The combustion promoting effect of the additive was confirmed by the higher carbon dioxide values and the lower oxygen values. Furthermore, the SO2 and SO3 concentrations of the waste gas were reduced. The two substances were converted to elemental sulfur.

20387 APTIC NO. 39275

Seegall, M. I., J. C. Napier, and W. A. Compton

CATALYTIC CONTROL OF NOX EMISSIONS FROM MOBILE SOURCES. (FINAL REPORT). *International Harvester Co., San Diego, Calif., Research Labs., Office of Air Programs Contract EHS 70-114, Rept. RDR 1700, 143p., Dec. 1971. 26 refs.*

NTIS: PB 204011

The catalytic approach toward the control of nitrogen oxide emissions from motor vehicle exhaust was investigated. Rate earth oxide catalysts were investigated and compared with selected transition metal and noble metal catalysts, i.e., Monel 400, Solar Monel 400 Mod and Core, copper dichromate, a platinum catalyst, and a palladium catalyst. The initial criteria for the catalyst were high effectivity for nitric oxides reduction, reduction, resistance to permanent damage by lead oxide and lead bromide compounds in the exhaust, physical stability, and economy. The design of experimental equipment for the gas reaction process for the investigation of physical and chemical properties of the rare earth oxide catalysts was studied. Also included were a theoretical NO equilibrium analysis, a reaction kinetics study, and a study in concentration of

NO, carbon monoxide, and carbon dioxide as a function of several reaction parameters of the catalytical gas reaction. The data were analyzed by nondispersive infrared analysis for the three gases and by titration for the measurement of ammonia generated. The Monel 400 catalysts were substantially more efficient than all others for NO reduction and minimum ammonia formation. The noble metal and copper dichromate catalysts were in the same NO reduction efficiency range; however, ammonia formation for the palladium and platinum catalysts were well beyond acceptable limits. (Author abstract modified)

20388 APTIC NO. 39681

Seibert, C. A., Jr. and D. L. Cleveland

PREFERENTIAL WITHDRAWAL OF CATALYST FINES TO REDUCE F. C. C. STACK LOSSES. *Oil Gas J., 53(4):78-80, 90, May 1954. (Presented at the American Petroleum Institute, Refining Division, Houston, Tex., May 12, 1954.)*

The catalyst recovery system at an oil refinery is described. The regenerated catalyst recovery system consists of a single stage battery of 10 Buell cyclones followed by a four-cell, eight- section Cottrell electrical precipitator. Both of these facilities are size selective. A collection efficiency between 99 and 99.5% for the electrial precipitator was indicated. The size selectivity of the electrial precipitator is less pronounced than for the cyclones. Because of this size selectivity, the loss of catalyst from the plant stacks is dependent not only on the quantity of material reaching these recovery facilities from the regenerator bed, but also on the particle size distribution of this material. The carryover of material to the precipitator and stack loss may be controlled by regulation of the amount of fines in the unit. Removal of material from the precipitator hoppers tends to increase the average particle size of the plant equilibrium catalyst. This shift in particle size comes about not only because considerable quantities of fines are removed from the plant, but also because the quantity of coarse equilibrium catalyst which may be removed to maintain inventory at a constant fresh-catalyst addition rate is decreased.

20389 APTIC NO. 39295

Selheimer, C. W., Lawrence White, and Glen Workman

CATALYTIC COMBUSTION OF FUMES FROM TALL OIL-GYLCERINE ESTERIFICATION, PILOT PLANT SIZE EQUIPMENT. *Off. Fed. Paint Varn. Prod. Clubs, 26(348):664-683, Aug. 1954. 223 refs.*

As part of a paint and varnish industry fume control project, fumes from a tall -oil glycerine esterification, generated in a pilot-plant-size unit, were passed through a portable catalytic combustion unit. Results of the test indicate the combustion unit was capable of considerable odor reduction, but the discharged gases were very irritating to the eyes and nose. Apparently sulfur compounds in the gas stream were converted to oxides. The unit is not recommended under such conditions. A bibliography covering all articles on catalytic oxidation for the years 1907 to 1952, including those but remotely connected to this problem, is included. (Author abstract modified)

20390 APTIC NO. 39296

Selheimer, C. W., John P. Antolak, and Jack Paskind

OXIDATION OF FUMES FROM TALL OIL-GLYCERINE ESTERIFICATION WITH OZONE. *Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):647-652, Aug. 1954. 5 refs.*

As part of a paint and varnish industry fume control project, fumes from tall oil-glycerine esterification were treated with ozone laden air in a pilot plant scale operation. Ozone was obtained from a commerical size electrostatic generator. Three cooks were conducted, using carbon dioxide as the blanketing gas. The fumes, after passing through a spray tower, were mixed with the ozone laden air. Before mixing with ozone the fumes were foul and irritating, while after ozone treatment, the foul odors were largely eliminated. The economics of this operation are covered to the extent of the data. The cost of equipment and operation are excessive when compared with other methods of fume treatment.

20391 APTIC NO. 38779

Shebzukhov, D. A., V. F. Denisov, T. N. Klendrov, and B. S. Gudin

PURIFICATION OF MERCURY CONTAINING GASES IN TUBULAR FURNACES FROM DUST IN DRY ELECTROFILTERS. *(Ochistka rtutsoderzhashchikh gazov trubchatykh pechey ot pyli v sukhikh elektrofiltrakh). Text in Russian. Tsvetn. Metal., 43(1):35-39, March 19, 1971. 4 refs.*

An electrostatic filtration facility for the removal of dust from mercury-containing gases produced by a tubular furnace was studied. This cylinder-shaped facility includes three vertical tubular precipitation electrodes, each provided with a high voltage central corona electrode made of a nickel-chromium-iron alloy. The dust-containing gas is first passed through a cyclone and then transferred into the central portion of the filter, where it is distributed and subjected to countercurrent circulation along the electrodes. Hydraulic resistance of the installation depends on the gas flow rate. The efficiency of dust removal increases with the applied voltage. The dust accumulated on the electrodes contains certain amounts of Hg compounds (mainly sulfur) and should be subjected to a Hg recovery procedure. Included are feasibility studies and design criteria of the facility, as well as various characteristics of the collected dusts.

20392 APTIC NO. 39082

Shibahara, Toshio and Kiyoshide Go

POWER FEEDER DEVICE FOR DUST-ARRESTING PLATE OF ELECTRIC DUST REMOVER. *(Denki shujinki no shujinban no kyuden sochi). Text in Japanese. (Matsushita Seiko K. K. (Japan)) Japan. Pat. Sho 47-1513. 2p., Jan. 19, 1972. (Appl. Sept. 12, 1968, 1 claim).*

The power feeder device is an electric power feeder rod on which dust-arresting plates of an electric dust remover are mounted. The feeder rod is combined with the specially designed holders allowing easy mounting and release of the dust-arresting plates. The feeder rod is a U-shaped frame with its open side being the front side. Both ends of the rod are fixed, via insulators, onto the internal side walls of the dust remover casing. A number of T-shaped holes are cut in the top side of the rod. The plate holder is a clip whose lower half is a triangular base. The holders are inserted into the T-shaped holes, one for each, in such a way that the triangular base may be securely held between the top and bottom sides of the U-shaped frame that is the feeder rod. Inserted this way, the holder is held in place. A dust-arresting plate is simply inserted into this clip-like holder for mounting and pulled off for removal.

20393 APTIC NO. 39073

Shinobiashi, Yoshimi

ELECTRIC DUST REMOVER. *(Denki shujinki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-1516. 3p., Jan. 19, 1972. (Appl. Oct. 15, 1968, 1 claim).*

This electric dust remover is equipped with the newly designed cleaning brush units which will be operated from time to time to remove dust accumulated on the electrodes so that high dust removal efficiency of the dust remover can be maintained. In the ionization section consisting of the discharge lines and grounded electrodes, the latter are tubular and rotary types equipped with brushes. As they are rotated, the brushes turn to rub the grounded electrodes to remove dust. In the dust-arresting section consisting of the charge elctrodes and grounded electrodes paired with each other, a number of dust-scraping brushes are mounted on the common shaft running through all the electrodes of both types in such a way that there may be one brush between each pair of the two electrodes. Bristles are planted onto both sides of a piece of metal plate to make the brush. Each charge electrode plate has a cutout in which to rest each brush when the brush is not operating, so that electric discharge generated through this brush between the two electrodes may be prevented. When the brushes are operated to remove dust from the electrodes, operation of the electric dust remover should be stopped. The test operation of this dust remover showed that the initial dust-removing efficiency of 95% was restored from 93% given after 10 hr of operation by means of operating the brushes for 5 min. Operated for 2 mo as above, the dust remover still gave the efficiency of 94% + or 1%.

20394 APTIC NO. 38771

Shirai, Kunio and Hiroshi Okamura

ADSORPTION OF SULFUR DIOXIDE BY COLLAGEN FIBERS. *(Koragen sen i ni yoru aryusan gasu no kyuchaku). Text in Japanese. Nihon Chikusan Gakkai-Ho (Japan. J. Zootech. Sci.), 41(11):551-556, 1970. 5 refs.*

The influence of alkali treatment and other forms of fiber modification on the ability of collagen fiber as a filtering material to adsorb sulfur dioxide was investigated. Untreated collagen fiber adsorbed about 11% of SO2 (as SO3); increased adsorption followed treatment such as methylation, acetylation, deamination, or bromoacetate treatment while decreased adsorption followed treatment with basic chromium sulfate or formaldehyde. Increasing the period of alkali treatment also increased the adsorptive capacity of the fiber. On the other hand, the adsorbability of SO2 was so closely related to the moisture content of collagen fiber that the amount of SO2 adsorbed corresponded with moisture content on an ascending straight line independent of differences in treatment.

20395 APTIC NO. 38799

Slack, A. V., H. L. Falkenberry, and R. E. Harrington

SULFUR OXIDE REMOVAL FROM WASTE GASES: LIME-LIMESTONE SCRUBBING TECHNOLOGY. *J. Air Pollution Control Assoc., 22(3):159-166, March 1972. 15 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 70th, Atlantic City, N. J., Aug. 29-Sept. 1, 1971.)*

Lime-limestone scrubbing as a control method for the removal of sulfur oxides from waste gases is reviewed with respect to process history, chemistry, reaction kinetics, dust removal, scrubbing temperature, gas-liquid-solid flow relationship, point of limestone introduction, slurry pH, scaling, system design and economics, and waste disposal. For the power plant situation, the gas supplie sulfur dioxide, sulfur trioxide, carbon dioxide, oxygen, nitric oxide, and nitrogen dioxide; sodium, potassium, chlorine, and iron come from the ash; and the limestone contributes calcium, magnesium, and other minor constituents. The main reactions in the scrubber are assumed to be absorption of SO2, hydrolysis to form sulfurous acid, and reaction of the sulfite ion from the H2S03 with the calcium ion from calcium carbonate or calcium hydroxide. A major problem in regard to particulates is the entrainment in the gas of solids from the scrubber slurry. Scrubber system design must consider type of scrubber, system turndown, size, gas and liquor distribution, isolation, effects of corrosion, erosion, oxidation, and wet-dry interface deposition, mist elimination, and gas reheat. The main process question for power plants is whether to introduce the limestone into the boiler or into the scrubber. The advantages and drawbacks are discussed.

20396 APTIC NO. 39656

Smith, Jack

COAST S LARGEST STEEL PLANT KEEPS AIR CLEAN. *Air Eng., 1(8):21- 24, Nov. 1959.*

The solutions to air cleaning problems at a steel plant are presented. The sinter plant stack was built 301 ft high to obtain better dispersion of the sulfur gases emitted. As a second step to eliminate the sulfur problem, all plant railroad equipment was diesel powered. Four Thomas continuous autometers were installed at varying distances from the mill to record sulfur concentrations in the atmosphere. Three devices were installed next to each blast furnace in order to clean the gases. First, the gas goes through a primary inertial-type dust catcher which removes 62% of the incoming dust. The gas is further cleaned to 98.75% in a gas washer. After the gas passes through a pair of water film electrostatic precipitators, 99.98% of the incoming dust is removed. The coke ovens are equipped with self-sealing doors. Baghouses and dust collectors were designed into the raw materials system, greatly reducing the amount of ore dust. The open hearth stacks were built higher than customary for proper dispersal of furnace emissions. Cottrell precipitators were installed on the open hearth furnaces.

20397 APTIC NO. 39435

Soo, Shao L.

CORE VELOCITY DISTRIBUTION IN SWIRLING PIPE FLOW. *Z. Angew. Math. Phys., vol. 21:125-129, 1970. 7 refs.*

The steady state condition of the core for vortex motion of a real fluid can be expressed by means of a Burger linear vortex if tha axial flow component coincides with the direction of decreasing pressure. The range of solid body rotation increases with the decrease of the pressure gradient. The core can be brought into steady state upon reaching a sufficient pressure drop opposing the flow direction. A knowledge of these steady state conditions is useful in estimating the performance of industrial cyclones.

20398 APTIC NO. 39449

Soo, S. L.

A CRITICAL REVIEW ON ELECTROSTATIC PRECIPITATORS. *Preprint, American Inst. of Chemical Engineers, New York, 28p., 1971. 35 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 64th, San Francisco, Calif., Nov. 28-Dec. 2, 1971.)*

Because of its basic configuration, the conventional electrostatic precipitator cannot attain the high efficiency required by proposed dust control legislation. In the basic plate wire configuration, the wide spacing required by rapping causes reentrainment of collected dust by turbulence. Rapping itself also causes reentrainment of dust. Moreover, the precipitators are large and bulky because the nonuniformity of spacing of corona wires to collector plates calls for long flow passages and large numbers of wires. As the electric field is normal to that of gas flow, the corona discharge decreases with increase in dust loading, resulting in low operating efficiency at excessive dust loading. Even in tubular form, the basic configuration is unsuitable for high-temperature, high-pressure design that might be needed in a precipitator installed ahead of a preheater or for a coal-burning gas turbine plant with ash removal ahead of the turbine. Universal application of precipitators for a wide range of particle properties calls for positive ways of cleaning, e.g., closed-cell rapping. Applications ranging from air conditioning to a power plant with magnetohydrodynamic topping and the relations to designs and operating conditions are discussed, identifying possibilities and fallacies.

20399 APTIC NO. 39272

Sood, Sudesh K. and Richard Karuhn

DEVELOPMENT OF PARTICULATE EMISSIONS CONTROL TECHNIQUES FOR SPARK IGNITION ENGINES. (FINAL REPORT). *IIT Research Inst., Chicago, Ill., Air Pollution Control Office Contract CPA-22-69-134, IITRI Proj. C6186, Rept. C6186-5, 96p., Feb. 1971. 30 refs.*

NTIS: PB 198033

Two techniques for the removal of particulate contaminants from spark ignition engine exhausts are examined. The first technique was based on the thermal deposition of lead aerosol particles in the size range 0.1-0.8 micron in a packed bed. The effect of gas-packing temperature differential, packing material, shape, size, contamination buildup, and gas velocity on collection efficiency of the bed was studied. The prime factor was the gas-packing temperature differential. At a gas velocity of 15.5 cm/sec, the collection efficiency of the device exceeds 95% at a temperature differential greater than 200 C. Increasing the gas velocity to 130 cm/sec lowered collection efficiency by 10-15%. The second technique was based on th use of sonic waves to increase the collisions between the aerosol particles and the relatively coarse particles of a fluidized bed. The effect of sound frequency, gas velocity, and power input to the sound driver units was studied. Collection efficiency increased sharply with power input to the sound driver units when standing sound waves were used. Analytical techniques used during the studies included a reflectometer and polarographic and colorimetric methods. (Author abstract modified)

20400 APTIC NO. 39101

Soole, B. W.

THE DESIGN OF ROTARY IMPACTION FILTERS WITH TAPERED FILAMENTS. *Aerosol Sci., 3(2):81-94, March 1972. 5 refs.*

The theory of the design of rotary filamentary impaction filters for the continuous removal of small particles carried at high concentrations in fast flowing gases is extended to include the use of tapered filaments so that the variation of impaction efficiency along the length of the filaments may be controlled. Four practical types of such filters are identified, each of which may be subdivided into several classes. Expressions for the characteristics of interest for all types and classes are indicated. (Author abstract)

20401 APTIC NO. 39676

Stormont, D. H.

HOW HUMBLE CUT VOLUME OF POLLUTANT BY 80% IN 8 YEARS OF EFFORT. *Oil Gas J., 59(6):124-128, Feb, 1961.*

The problem of sulfur compounds at the Bayway refinery of the Esso Standard division of Humble Oil and Refining Co. was largely solved by reducing the amount of sulfur in the fuel fired to furnaces. Hydrogen sulfide and acid sludges which years ago were burned, now are taken by a neighboring chemical company and converted into elemental sulfur and sulfuric acid. Smoke emissions have been reduced in a number of ways; through using draft gauges, damper controls, stack-gas oxygen analyzers, and automatic feed control of fires, furnaces are fired more efficiently. A combustion control program includes routine checking of combustion conditions and efficiency in each process furnace. Installing floating roofs on tankage formerly equipped with cone roofs was responsible for most of the reduction in tank-evaporation. Other evaporation sources have been cut down through application of the policy that the best control method is to keep oil and other contaminants out of the sewers. A new incinerator is utilized for waste disposal. Reduction of catalyst dust losses and future improvements are also indicated.

20402 APTIC NO. 39083

Sugimura, Akira

CLEANING DEVICE FOR CONTAMINATED GAS. *(Osen kitai no seijo sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-1512. 3p., Jan. 19, 1972. (Appl. April 30, 1969, 1 claim).*

This scrubber is especially suitable for cleaning flue gas. It features three-stage cleaning, compact design and economical operation requiring no special filters or chemicals. When installed for an incinerator, for example, the upright flue is divided horizontally by a hollow partition plate. The flue gas intake duct is branched out from the flue below the partition plate and leads the flue gas downward into the scrubber tank containing water to the prefixed level. A water pipe from a pump installed outside opens in the flue gas intake duct and is equipped with a venturi nozzle. The intake port of the pump is connected to the side near the bottom of the tank by a water pipe. A screen filter is installed before the mouth of the water pipe leading to the intake port of the pump. The flue gas exhaust duct equipped with an exhaust fan runs from the ceiling of the scrubber tank to the flue above the partition plate. Some distance below the ceiling of the tank is installed a horizontal water membrane-forming board provided with a number of small holes. Another pipeline connected to fresh water source extends into the hollow partition plate. Branched from this pipeline is a water pipe opening in the flue gas exhaust duct immediately above the tank. As combustion gas from the incinerator ascends through the flue, it is blocked by the partition plate and diverted into the scrubber tank through the flue gas intake duct in which it is scrubbed with water jetted out from the venturi nozzle for the first-stage cleaning. The gas hits the water in the tank and is scrubbed with it, thereafter rising to flow through the water membranes formed in and on the board since pressure above and below the board differs due to suction by the exhaust fan above. The gas is again scrubbed with water from the fresh water nozzle in the exhaust duct. The partition plate is cooled with fresh water running through the fresh water pipeline while the fresh water is in turn heated and jetted through the last nozzle for the final scrubbing just mentioned. This keeps the temperature of the cleaned gas high enough for effective diffusion into the atmosphere.

20403 APTIC NO. 38901

Suwa, Yu

PROCESS TO RECOVER HIGH-CONCENTRATION SULFUR DIOXIDE FROM LOW-CONCENTRATION SULFUR DIOXIDE. *(Teinodo aryusan gasu yori konodo aryusan gas o kaishu suru hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-30087. 3p., Sept. 1, 1971. (Appl. Sept. 20, 1969, 1 claim).*

Previous methods to recover sulfur dioxide from stack gases used a large quantity of steam, 4-5 tons/SO2 ton, for the process in which acidic ammonium sulfite is pyrolyzed to obtain high concentration SO2. This results in high operational cost, which has made its industrial application impractical thus far. The new recovery process has been devised to eliminate this high cost, thereby realizing the highly economical recovery of high concentration SO2. The low-concentration SO2 is scrubbed with (NH4)2SO3; SO2 is then collected as acidic ammonium sulfite. This solution is pyrolyzed to obtain high-concentration SO2. The nw method uses a contraflow liquid-gas scrubber in which low-concentration SO2 and the ammonium sulfite water solution flow counter to each other to arrest SO2 in form of ammonium sulfite. A hydrophilic organic solvent is added to this water solution to give a soluble ammonium salt. A small amount of water is added to the ammonium salt to prepare a slurry of a high concentration acidic ammonium sulfite/ammonium sulfite/ammonium sulfate mixture. The slurry is then pyrolyzed and reduced to the mixture gas of steam and SO2. The mixture gas is cooled to recover high-concentration SO2, while the dilute water solution obtained by cracking the ammonium salt and the hydrophilic organic solvent is distilled for separation and recirculation.

20404 APTIC NO. 38937

Tadokoro, Asao

DEVICE TO ABSORB THERMAL EXPANSION IN EXHAUST GAS AFTERBURNING DEVICE. *(Haikigasu sainensho sochi ni okeru netsubocho kyushu sochi). Text in Japanese. (Toyo Kogyo Co., Ltd. (Japan)) Japan. Pat. Sho 47-5012. 3p., Feb. 12, 1972. (Appl. April 24, 1969, 3 claims).*

An exhaust gas afterburner fitted in the exhaust pipe of an internal combustion engine is usually of double-wall construction that gives more effective purification of the exhaust gas than a single-wall type. A heat-insulating material is packed up between the inner and outer walls so that the outer wall is completely insulated from high temperature. Therefore, thermal expansion of the inner wall directly exposed to high combustion heat is much greater than that of the outer wall. This sometimes results in cracking of the casing. The thermal expansion absorber device introduced here is fitted in the exhaust gas intake port of the double-wall afterburner. When the inner wall expands with heat in the horizontal direction, a slide guide/supporting plate also slides horizontally to allow the expansion of the inner wall. When the short pipe expands with heat in the vertical direction, the slide guide/supporting plate permits the expansion of the pipe in that direction, since the plate is loosely fitted. The slide guide/supporting plate can be firmly fitted onto the pipe if it is made of flexible material and permits flexibility in the vertical direction.

20405 APTIC NO. 39389

Taille, Renaud de la

POLLUTION FROM AUTOMOBILES: THE 100 F SOLUTION. *(Pollution auto: la solution pour 100 F). Text in French. Sci Vie., no. 639:112-119, Dec. 1970.'*

A recent French invention that effectively reduces the carbon monoxide content of the automobile exhaust is described. The invention represents a very simple device, a perforated cone to be inserted between the carburetor and supply tube. The mixture of air and gasoline is homogenized by this perforated cone, and thus nearly complete combustion is provided. In addition, the operation of the individual cylinders is balanced. The carbon monoxide content of the exhaust lies in a range of 0.2-1%, which the amount of unburned hydrocarbons is reduced to 1/2 to 1/6 of the original value. A test route of 37,000 km revealed 0.4% of CO and 14.5 % of carbon dioxide at 750 rpm, and 4.65% of CO and 11.5% of CO2 at 4000 rpm. The respective values for slow-up at 850 rpm were 0.6% and 12.5%. The device was not tested for nitrogen oxide emissions. thousands of cars already equipped with such a device operate satisfactorily.

20406 APTIC NO. 39323

Takanari, Noboru, Natsuki Fujimori, and Tadao Ohtsuka

SURVEY ON GASIFICATION-DESULFURIZATION OF HIGH-SULFUR HEAVY FUEL OIL FOR POWER GENERATION. *(Jushitsuyu no gasuka datsuryuho no chosa). Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu Kenkyusho Hokoku (Tech. Lab., Central Research Inst., Electric Power Ind., Rept.), no. 70108:1-44, June 1971. 45 refs.*

Methods proposed or under development for heavy oil gasification-desulfurization are surveyed in foreign literature. The general trend of the methods if toward pressurized gasification-dry or wet desulfurization-dust removal under medium pressures. Several remarkable advances in process engineering are examined. There are still technical difficulties in soot prevention for gasification and the dry dust removal process within the range of achieving clean fuel gas. One important problem is the development of reliable and economical systems to use clean gas on the scale usually adopted for power generation. These new methods will also promote the use of very low quality fuel, e.g., asphalt.

20407 APTIC NO. 38936

Tamura, Takaaki and Tsutomu Kato

REMOVAL OF CARBON MONOXIDE IN THE ATMOSPHERE. *(Kukichu no issanka tanso o jokyo suru hoho). Text in Japanese. (Kachita Co., Ltd. (Japan)) Japan. Pat. Sho 47-3081. 3p., Feb. 14, 1972. 3 refs. (Appl. June 20, 1968, 1 claim).*

This invention concerns the process in which carbon monoxide contained in the atmosphere is oxidized by a catalyst and reduced to harmless carbon dioxide. For oxidation of CO contained in automotive exhaust gas, the new catalyst made from natural zeolite mixed with manganese oxide and copper oxide was developed. Although the new catalyst is effectively used for 20,000 km, its service life is drastically shortened when exposed in air of room temperature having a relative humidity of 70% or higher and when its zeolite content has absorbed the moisture to a saturation point. To prevent this defect, the catalyst layer is preceded by the first desiccant layer and followed by the second desiccant layer. When comparatively wet air containing CO is taken in through an air intake pipe equipped with a four-way cock, the wet air is dried by the first desiccant layer. The now dry air then flows into the catalyst layer for the oxidation of CO with the catalyst. When the desiccatives in the first layer become too moistened, the flow direction of the air is reversed by means of the four-way cock; the second desiccant layer to the catalyst layer to the first desiccant layer. As the air is desiccated by the second desiccant layer and treated by the catalyst layer flows through the first desiccant layer, it removes moisture from the first desiccant layer, thus drying it up. When the second desiccant layer becomes too moist, the flow direction is again reversed. This prolongs the service life of the catalyst. For the desiccant, silca gel or activated alumina which easily absorbs and desorbs moisture are used.

20408 APTIC NO. 39649

Tate, Wallace F.

SMOKELESS FLARE SOLVES PROPANE DISPOSAL PROBLEM. *Civil Eng., (N. Y.), vol. 26:62-65, Sept. 1956.*

A refinery installation designed for the emergency disposal of vaporous propane at a maximum rate of 1,200,000 standard cu ft/hr is described. This is accomplished through the use of a liquid knockout system in conjunction with a smokeless ground flare. The blowdown system is so designed that the entire inventory of 5000 bbl of liquid propane can be released from the unit in one hour. During this release period, approximately 15% of the total liquid inventory will flash to vapor and be burned in the ground flare. The liquid propane remaining in solution with the kerosene in the 8000-bbl sphere which receives pumped propane from the bottom of the blowdown drum may be vaporized and flared over a 7-hour period. The smokeless burners are air-aspirating with a venturi-shaped cross-section. A large quantity of primary air is aspirated, which, in conjuction with secondary induced air, produces complete combustion and consequently a smokeless flame. The high gas velocity required at the burners to produce proper primary air aspiration is maintained by an automatic pressure control system.

20409 APTIC NO. 39615

Tearle, Keith A.

REDUCING POLLUTION BY CATALYTIC OXIDATION. *Ind. Process Heat., 1970:32-33, Nov. 1970.*

In large industrial plants, the two most common fuels are coal and residual fuel oil, which release sulfur dioxide upon combustion. The SO2 is subsequently converted by natural chemical reaction in the atmosphere into sulfuric acid which is harmful to health and materials. A further pollutant emitted in flue gases is fly ash. An integrated catalytic oxidation system and a reheat system are reviewed as control methods for electric power stations. The integrated system, consisting of a precipitator, a converter, an economizer, an absorbing tower, and an air heater, necessitates incorporation into the plant at the design stage. The reheat system may be fitted into an existing plant; the apparatus and procedure are slightly modified. Control, instrumentation, and system application are discussed.

20410 APTIC NO. 38960

Todo, Masayuki

AUTOMOTIVE EXHAUST GAS PURIFICATION CATALYST. *(Jidosha haiki gasu joka shokubai). Text in Japanese. Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.), 15(7):103-108, 1971. 11 refs.*

The known catalysts for carbon monoxide, hydrocarbons, and nitric oxide in automotive exhaust gas are reviewed and the principles of catalytic reactions are discussed. All the known catalysts for oxidation of CO or hydrocarbons are precious metals that would effectively maintain an oxidized atmosphere with a high partial pressure of oxygen on the surface, or oxides of cobalt, manganese, copper, nickel, chromium, or combinations of these. Oxides of cobalt or nickel perform well experimentally but are not used in practice because, in addition to their high cost, spinel formation occurs in reaction to an alumina carrier. Their refractory property is also extremely inferior. Catalysts patented in the U. S., Great Britain, and Japan are listed. Catalysts being developed for NO elimination fall into two groups. One consists of metal oxide catalysts having relatively excellent low-temperature activity but less satisfactory strength and refractory properties. The second group consists of alloy catalysts such as copper-nickel alloy or copper-coated stainless steel. These are strong and show an excellent NO elimination ratio at high temperature. Consequently the first group will be used for mufflers and the second group for the manifold flange.

20411 APTIC NO. 39434

Tomany, James P.

THE CONTROL OF ALUMINUM CHLORIDE FUMES. *Light Metal Age, 26(9/10): 19-20, 36, Oct. 1968. (Presented at the Air Pollution Control Association, Annual Meeting, 61st, St. Paul, Minn., June 23-27, 1968.)*

Chlorine, hydrogen chloride, aluminum chloride, and aluminum oxide may be produced from aluminum processing furnaces. The latter two contaminants are in the form of solid particles which if untreated, will produce a white plume of varying density at the stack. Flow rates and other process conditions are indicated. Bag filters will collect a reasonable amount of the particulates, but they may become clogged by the hygroscopic aluminum chloride, while the elevated temperatures of the hot gases create a fire hazard. The collection of particulates in aluminum processing requires scrubbing with alkaline solutions in equipment which will not plug. The UOP floating-bed scrubbing system for handling aluminum chloride fumes is described. The major process variables which determine the scrubber design are the chlorination rate, the chlorination cycle, and the size and type of melt furnace.

20412 APTIC NO. 39298

Tremaine, Breckinridge K.

MASKING INDUSTRIAL MALODORS. *Air Repair, 3(2):59-63, Nov. 1953.*

The superimposing of a more pleasant odor upon a malodor, thus making its offensive nature less objectionable, is referred to as masking. To determine if masking is possible, it is first necessary to measure intensity of the malodor and of a suitable aromatic odorant. The masking odor may be applied by spraying, vaporizing, or atomizing the selected odorant into air/gas streams; adding directly to a process whenever possible; adding to scrubbing liquors; spreading or floating on contaminated surfaces without dilution. Costs are cited. Another phase of any odor abatement program is study of local weather conditions, particularly temperatures, humidity, inversion levels, and turbulence.

20413 APTIC NO. 39433

Tremaine, Breckenridge K.

RECENT DEVELOPMENTS IN MASKING SULPHATE PULP MILL MALODORS. *Tappi, 37(8):141A-143A, Aug. 1954. 11 refs.*

While masking agents are not the complete answer toward overcoming an air pollution odor nuisance and are not always 100% effective, they are a tool which when properly applied will help to change the perception of the malodors from a sulfate pulp mill process. The use of masking agents do not incur major capital expenditures. Improved odor control is possible when a dual treatment is established which consists of applying the masking agent to the digester and also to the heat recovery system. Comments of mill observers not using a dual treatment are included. The study of local weather conditions is also an important phase of an odor abatement program. Knowledge of temperatures, humidity conditions, inversion levels, and turbulence is of great importance to establish dispersion characteristics.

20414 APTIC NO. 39209

Turk, Amos

OBNOXIOUS ODORS. *Ind. Wastes, 3(1):9-14, Jan.-Feb. 1958. 11 refs. (Presented at the American Public Health Association.)*

Methods of odor control by elimination of the odorant (dispersal, adsorption, absorption, combustion) and by modification of odor perception are discussed. Stack dispersal should be recommended for deodorization only after data on odor pervasiveness are obtained; in many cases the method is unsatisfactory. The complete oxidation of most odorants in air causes deodorization because the final products are odorless or have higher odor thresholds than their precursors. Equipment used for odor control by combustion comprises direct-fired air heaters and devices for catalytic combustion. Odor control by adsorption is limited basically to the use of activated carbon as the sorbent. Equipment selection generally depends on requirements for total capacity, allowable pressure drop, and space. A formula for the service like of an adsorption system is given. Where odorous vapors are soluble or emulsifiable in a liquid, with or without chemical action, absorption methods may be suitable. Odor control on a perceptual basis does not necessarily involve physical or chemical changes. When such control is achieved by the non-reactive admixture of an odorous atmosphere or gas stream with other vapors, the process is called odor modification.

20415 APTIC NO. 39427

Turk, Amos

CONTROL. *A.M.A. Arch. Ind. Health, 17(5):542-544, May 1958. 13 refs.*

Odor control procedure should involve three phases: analysis, control, and evaluation. Analysis includes measurements of the intensity and acceptability of an odor; tracing to source through perceptual or physiochemical procedures; and analysis, at the point of control, to predict control requirements. Different controls are required for confined atmospheres (e.g., stack gases), nuisance points (e.g., intakes for buildings), and unconfined atmospheres (e.g., open dumps, lagoons). Techniques for controlling odorants in confined atmospheres are catalytic combustion, incineration, vapor recovery, and odor modification in the gas phase. An activated carbon system is the preferred control method for nuisance points, while nonreactive odor modification is usually the only method available for open atmospheres. The evaluation of any abatement method must demonstrate the extent to which the adverse effect on people is controlled.

20416 APTIC NO. 39756

Vandehoeck, Paul

COOLING HOT GASES BEFORE BAGHOUSE FILTRATION. *Chem. Eng., 79(9): 67-70, May 1, 1972.*

Successful operation of arrays of cloth dust arresters or baghouses in filtering high temperature gases requires that the gases be properly cooled prior to filtration. The simplest method of cooling exhaust gases is to dilute them with ambient air. However, dilution is almost always uneconomical because the volume of ambient air required to achieve the desired cooling is so great that a substantially larger baghouse is required to handle it all. Radiation cooling transfers heat from the gas stream to the atmosphere via the duct walls, as the gas travels toward the dust arrester. Evaporative cooling is accomplished in injecting fine water droplets into the gas stream--the droplets evaporate, absorbing heat from the gas. The latter two methods are described, including pitfalls to avoid and ways of cutting costs.

20417 APTIC NO. 38750

Vincent, Daniel B.

GAS CLEANING APPARATUS. *(Assignee not given.) U. S. Pat. 3,618,299. 4p., Nov. 9, 1971. 8 refs. (Appl. April 1, 1969, 4 claims).*

The dry cyclone type collectors, while separating out most of the fine dust, are still a nuisance when applied to a plant operating continuously. While the percentage hourly separation is good, total daily quantities of dried material deposited all over the neighborhood are still the source of objections. The spray tower cannot be used where stream pollution laws prevent dumping of waste liquors. A separator is presented in which exhaust gases containing entrained particles are led centrifugally and downward in a cylindrical vessel provided with a liquid spray. Passing out of the lower end of the first vessel, the gases travel up the annulus between that vessel and a larger cylindrical vessel. The annulus is provided with frustoconical baffles wet by liquid sprays which serve to change direction of gas flow and to throw liquid with entrained particles toward the inner and outer walls of the annulus where falling films result. The liquid for the upper few baffles is preferably water and for the lower baffles, thin liquor. Two adjacent intermediate baffles extend to the respective sidewalls for draining the fresh water washing zone. (Author abstract modified)

20418 APTIC NO. 39655

Vivian, C. H.

SMOG. PART 2, PETROLEUM INDUSTRY CONTROL TECHNIQUES. *Compressed Air, 63(9):17-23, Sept. 1958.*

Routine pollution control duties in major Los Angeles area oil refineries include checking oil pumps and valves for leakage and periodically determining the composition of all stack emissions. The loss of volatile products through leaking packing glands on pumps has been greatly reduced bby installing mechanical or lubricated pressure-type seals. Another approved and accepted control measure is the tank-vapor recovery system which utilizes a compressor. Compressed vapors are stored in either fixed-root or floating roof tanks. Different types of compressors are described. A packaged system designed to capture gasoline vapors at loading racks and convert them into a more stable saleable product is available. Various vapor recovery systems are described.

20419 APTIC NO. 39614

Waddington, John N.

DUST CONTROL AND THE ENVIRONMENT. *Ind. Process Heat., 1970:43-44, Nov. 1970.*

There are two quite distinct areas where the control of airborne particulate matter is important. First, product control systems where a product in particle form is aerated under controlled conditions as an integral part of the process; second, nuisance dust which is generated incidentally in an industrial process. Essentially all dust control systems consist of a hooding device, ducting, a collector, and a fan. The characteristics of settling chambers, inertial or centrifugal separators, wet collectors and gas scrubbers (venturi scrubbers), electrostatic precipitators, fabric filters, and absolute filters are reviewed.

20420 APTIC NO. 38783

Weber, Ekkehard

DUST COLLECTORS FOR CUPOLA FURNACES AND THEIR COSTS. *(Staubabscheider fuer Kupoloefen und deren Kosten). Text in German. Giesserei (Duesseldorf), 59(7):209-215, 1972. 4 refs.*

An examination of 48 hot-blast and cold-blast furnaces with average melting zone diameters of 800 to 1000 m yielded an average dust emission of 8 kg/ton iron. The major part of the dust particles comes in sizes of 2 micron and of 20 to 50 micron. At most of the plants, 30% of the dust has grain sizes below 20 micron and about 10 to 15% below 10 micron. A look at the top gas and waste gas quantities reveals that top gas, i.e., the gas which develops at the melting process, accumulates in much lower quantities than waste gas, i.e., top gas mixed with air. The waste gas quantitis may reach eight times the quantity of top gas. Based on this fact, dust cleaning nowadays focuses on the top gas. In the early years of dust cleaning mostly spark chambers were used. The collection efficiency of these chambers increased with the decreasing speed of the gas rising in the chamber. Spark chambers can be used for preliminary dust collection at the most. Sometimes the spark chambers were equipped with nozzles for water injection to increase the collection efficiency. But only slightly better results were achieved than with spark chambers alone. Centrifugal separators are also not suitable in most cases. For satisfactory results (i.e., dust concentrations of less than 1.5 kg/ton of iron) electrostatic precipitators, cloth filters, and high-quality wet collectors must be used. The costs for centrifugal dust collection amount to about $1/ton of iron, for wet collection more than $3/ton of iron, and for venturi scrubbers, dry electrostatic precipitators, or cloth filters, $14/ton of iron.

20421 APTIC NO. 39680

Westhaver, L. J.

THE METALS INDUSTRY AND AIR POLLUTION ABATEMENT. *Ind. Wastes vol. 1:118-120, Jan.-Feb. 1956. (Presented at the Southern California Conference on Elimination of Air Pollution, Los Angeles, Calif., Nov. 10, 1955.)*

Control of air pollution by the metalworking industry is discussed. Grey-iron foundries operating cupola are equipped with a collection system utilizing baghouses or electrostatic precipitators. Others substitute reverberatory or electric furnaces to minimize dust and fume generation. Non-ferrous foundries bring themselves into compliance with the local regulations by employing slag covers in melting operations or by the use furnaces which reduce the amount of dust and fumes involved. The steel industry has replaced oil-fired steam locomotives with diesel electric equipment, equipped mill stacks with electronic smoke detection devices, and educated employees operating potential smog producing equipment. Electrostatic precipitators are installed on furnaces. The varied experiences in applying electrostatic precipitators, the principal equipment used in most installations, indicate a need for further basic information on the factors governing their operation. The metal industry is also aware of the problem of fume and dust controls, and is currently taking corrective measures.

20422 APTIC NO. 39556

Wilcox, R. H.

PUT INDUSTRIAL ODORS TO WORK. *Mill Factory, 54(2):126-127, Feb. 1954.*

The use of an Oxycat to convert industrial waste gases to heat or power and control air pollution is described. Catalytic bricks containing porcelain rods are placed in process or furnace exhaust stacks. Waste gases flow over the rods, whose alumina and platinum alloy coating oxidizes the pollutants and releases heat, carbon dioxide, and water. Four applications include installation of the oxycat stacks of an industry which coats continuous metal coils with synthetic lacquers and enamels, a refinery, and plant producing powdered metal components, and installation in a muffler to adapt gasoline fork trucks to inside operations.

20423 APTIC NO. 39575

Wilson, Albert W.

PORT TOWNSEND RECOVERY BOILER IS ALMOST ODORFREE. *Pulp Paper, no. 4:78-82, April 1971.*

The design and operation of a new recovery boiler installed at a kraft pulping plant are reviewed. Improved odor control is effected by preventing any direct contact of black liquor with outgoing flue gases. Formerly, the gases went to the cascade evaporators directly from the boiler; the odor gases released by evaporation of black liquor are now burned in the furnace. The problems involved in the construction, planning, installation, and running of the boiler are reviewed.

20424 APTIC NO. 39189

Wolf, Herbert I.

SULFUR FROM SULFUR DIOXIDE. *(Schwefel aus Schwefeldioxyd). Text in German. I. G. Farbenindustrie A. G., Ludwigshafen (West Germany), Dept of Inorganic Chemistry, PB Rept. 66511, 12p., May 10, 1937.*

Experiments were performed on the conversion of sulfur dioxide from roasting gases (and thus from pyrites) to sulfur. A two step procedure comprises an iron reduction furnace lined with fire-brick, a contact furnace filled with nut-sized bauxite calcined at 900 C, and a tower for the separation of the molten sulfur. The SO2 is first reduced with semicoke in the reduction furnace to a mixture of carbon oxysulfide and carbon disulfide which is subsequently oxidized with additional SO2 in the contact furnace to sulfur and carbon dioxide in a technically feasible process. Semicoke makes it possible to conduct reduction at 700 C while older processes, operating with coke-oven coke, had to work at over 1000 C which is uneconomical because much coke is burned unnecessarily. With a yield of 95% S, 100 kg sulfur requires 59 kg semicoke. Costs are cited.

20425 APTIC NO. 39666

Woodward, E. R. and E. G. Fenrich

AIR-CONDITIONING ODORS BANISHED BY NEW TREATMENT. *Food Eng., 24(4):75-76, 207, April 1952. 3 refs.*

A combination of chlorine and chlorine dioxide appears to be effective for deodorizing obnoxious gases emanating from animal fat and fish rendering plants. By reaction of an excess of chlorine water with sodium chlorite solution, chlorine and chlorine dioxide are formed. The odors are then drawn through a suction tee into a water line discharging to a tank where makeup water containing chlorine and chlorine dioxide is added. Water from this tank is then recirculated to the absorption system. Chlorine dioxide has a selective oxidizing action which destroys many objectionable organic odors. Several cases are cited in which the offensive gases evolved during processing are evacuated to an outside scrubber tower which contains a reservior of chlorine dioxide.

20426 APTIC NO. 38888

Yagi, Shizuo, Akira Ishitsuya, and Toshio Nomura

BLOWBY GAS DISPOSAL DEVICE FOR INTERNAL COMBUSTION ENGINE. *(Nainenkikan ni okeru burobai gasu no shori sochi). Text in Japanese. (Honda Motor Co., Ltd. (Japan)) Japan. Pat. Sho 47-4525. 4p., Feb. 8, 1972. 1 ref. (Appl. April 5, 1968, 1 claim).*

Blowby gas, generated in the crankcase of the engine, is lead into the exhaust pipe so that it may be burned with the high-temperature exhaust gas from the engine, thus preventing air pollution. The device features the control valve provided in the blowby gas duct connecting the interior of the crankcase to the exhaust pipe. The control valve is so interlocked with the crankshaft that it may open only at or about the time the exhaust pipe valve starts opening. While pressure in the exhaust pipe is about equal to the atmospheric pressure at or about the time the exhaust valve starts opening, pressure in the crankcase rises more or less, causing a pressure difference between the two. This pressure difference causes the control valve to open, letting the blowby gas flow into the exhaust pipe where it is burned with hot exhaust gas. The control valve then closes so that the ensuing drastic increase in the intra-crankcase pressure will not cause the high-pressure exhaust gas to flow back into the crankcase, thereby preventing deterioration of the engine oil that can result from backflow of the exhaust gas into the crankcase.

20427 APTIC NO. 39131

Yamaguchi, Takaaki

EXHAUST GAS (SO2), (3) DIRECT DESULFURIZATION. *(Haigasu (SO2), (3) Chokudatsu). Text in Japanese. Karyoku Hatsuden (Thermoelectric Power Generation), 23(3):280-285, March 1972.*

Following a brief discussion of the hydrodesulfurization process, various problems involving the direct desulfurization process are discussed, such as the problem of catalyst life. Measures suggested to prolong the catalyst life include: a fine-meshed strainer installed at or about the intake port of the reaction tower or the fuel pump; a protective reaction column installed before the desulfurization reaction tower in order to remove most of metal content and residual carbon content. Another problem is the large-volume consumption of hydrogen, which accounts for 40-50% of total desulfurization cost. Solution of this problem depends on development of a new catalyst that can reduce consumption of hydrogen and on how the material hydrogen can be made available at a lower price. Since desulfurization equipment handles large volumes of hydrogen, harmful gases (such as hydrogen sulfide) and corrosive substances under high temperature and pressure, it is subject to problems of corrosion and vibration. To prevent the corrosion, ultra-low carbon steel, ferrite stainless steel, and/or chrome-molybdenum steel are used. Or the equipment may be washed with a sodium carbonate water solution when opened or disassembled, or filled with a slightly pressurized light-quality hydrocarbon gas if a sealed type. Pollution problems range from air and water pollution to waste matter and bad odors. Disposal of hydrogen sulfide contained in the waste gas in large quantity is the greatest problem. The gas is scrubbed with caustic soda solution while a hydrogen sulfide absorber device is provided to separate the hydrogen sulfide.

20428 APTIC NO. 39381

Yanagihara, Shigeru

AUTOMOTIVE EXHAUST AND NITROGEN OXIDES. *(Jidosha haiki to chisso sankabutsu). Text in Japanese. Kikai Gijutsu Kyokai Kaiho (Trans. Assoc. Mech. Tech.), 23(5):177-183, 1971. 8 refs.*

Nitric oxide is the major nitrogen oxide in the exhaust gas, while nitrogen dioxide is the major nitrogen oxide in air. Nitrogen dioxide results from the oxidation of the NO which is considered to be less toxic. The results of the photochemical reaction of propane with NO at different initial concentrations at an irradiation intensity of 700 mW/sq cm and 28 C showed that the rate of oxidation of NO to NO2 and the concentration of the oxidant increased significantly. The formation of NO in an internal combustion engine is not fully understood, but the concentration in gasoline engines is closedly related to the engine variables including air/fuel ratio, spark timing, compression pressure and manifold pressure. An experimental result showed that an air/fuel ratio of about 16 gave the largest NO emission. Factors to reduce NO formation were mentioned with intensive discussions on the change of air/fuel ratio, the changes of combustion time, changes of the shape of combustion chamber, and the recycling of exhaust gas.

20429 APTIC NO. 38807

Yasinskiy, A. N., R. S. Suprunenko, L. A. Volkova, and I. D. Shabliyenko

HIGH-TEMPERATURE GAS SCRUBBING FROM THE OPEN-HEARTH FURNACES. *(Vysokotemperaturnaya ochistka gazov, otkhodyashchikh ot martenovskikh pechey). Text in Russian. Metallurg, no. 8:21-23, Aug. 1971.*

A gas scrubber including 10 venturi tubes, two cyclone-type drop separators, an evaporating chamber, and two fans was developed and installed at a steel plant open hearth furnace. Before reaching the venturi tubes equipped with tangential nozzles, the waste gas can be cooled in an economizer or in the evaporating chamber. The gas leaving the venturi tubes is led through the drop separator and two parallel cyclones with water spray. The effect of the preliminary gas cooling by water added to the evaporating chamber on the efficiency of the gas scrubber was investigated. The preliminary cooling and humidifying showed no advantages since the dust concentration in the gas leaving the scrubber was the same (0.110-0.150 g/N cu m) with or without cooling. To maintain a gas temperature of 300 C before the scrubber, two involute nozzles with a total throughput of 20 cu m/hr were installed in the collector ahead of the venturi tubes. Scrubbers without preliminary gas cooling will be applied in new projects.

20430 APTIC NO. 38939

Yoshioka, Naoya, Chikao Kanaoka, Hitoshi Emi, and Masao Yasunami

COLLECTION EFFICIENCY OF AEROSOL BY AN ISOLATED CYLINDER - GRAVITY AND INERTIA PREDOMINANT REGION. *(Koritsu ento ni yoru earozol no hoshu koritsu - Juryoku oyobi kansei shihai royoiki). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 36(3):313-319, March 1972. 8 refs.*

When an aerosol whose grain size is around one micron is mechanically filtered by a fiber-packed filter layer for removal of the aerosol particles, the collection efficiency is estimated by taking into consideration inertia, diffusion, and interception while disregarding the possible effect of gravitation. However, when an aerosol consisting of larger particles ranging from a few micron to around 10 micron in size is filtered by the fiber filter layer, it is presumed that gravity affects the collection efficiency more than diffusion in the region where the linear velocity is smaller. The same can be true of aerosol consisting of metal particles of a higher specific gravity. Based on this prediction, the theoretical collection efficiency of an isolated cylinder under the influence of gravitational settling plus interception and gravitational settling only was analytically calculated and represented in several equations. The gravity/ interception collection efficiency formulas thus developed were further modified to include the effect of the inertia, an additional factor. The theoretical collection efficiency obtained by the calculations was then compared with the experimental collection efficiency. The comparison seems to indicate the above-noted theory is sufficiently valid. However, the validity is still subject to further review when more data of actually measured values on the fiber-packed filter become available.

20431 APTIC NO. 39585

Yoshioka, Naoya, Kiochi Iinoya, Chikao Kanaoka, and Hitoshi Emi

ON THE INERTIAL COLLECTION EFFICIENCIES OF AEROSOL PARTICLES BY A TRAGET SPHERE. *(Tanichi kyu ni yoru earozoru ryushi no kansei hoshu koritsu). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 36(1):104-108, Jan. 1972. 12 refs.*

The dependency of inertia collision efficiency on Reynolds number was investigated theoretically at Reynolds less than 200 and experimentally at Reynolds between 100 and 1500. The theoretical value was calculated using equations which were previously reported, and the experimental value was calculated under the conditions that all assumptions for the theoretical consideration were satisfied. The experimental method and conditions to meet the above requirement were described in detail. The comparison of the theoretical and experimental value of the collection efficiency led to the following conclusions: At Reynolds numbers between 100 and 200 and with an inertia parameter larger than 0.3, the collection efficiency of a spherical flow was almost the same as that of a potential flow. The collection efficiency obtained theoretically was consistent with the experimental value in the adhesion of aerosol particles on a target sphere.

20432 APTIC NO. 39362

Yuzawa, Hiroshi, Tooru Nakagawa, and Masamitsu Okumura

CARBURETOR WITH COASTING ENRICHER FOR EXHAUST EMISSION CONTROL. *(Haiki gasu taisaku kosuchingu riccha kikaki). Text in Japanese. Jidosha Gijutsukai Ronbunshu (Proc. Soc. Automotive Engrs.), no. 2:100-103, July 1971. 2 refs.*

Effects of air/fuel mixture characteristics on engine exhaust were studied during engine deceleration in an air injection-reactor-type engine. Hydrocarbon emissions are effectively reduced by supplying a rich mixture and a greater mixture volume during deceleration than at idling. A carburetor was developed with an enrichment device which supplies a rich air/fuel mixture only at deceleration, thus reducing hydrocarbon emissions during this engine operating cycle.

20433 APTIC NO. 39149

Zenkner, K.

FLAME SIZE AND BURNING BEHAVIOR IN THERMAL AFTERBURNERS. *(Flammengroesse und Ausbrandverhalten bei thermischen Nachverbrennungsanlagen). Text in German. Luftverunreinigung, 1971:31-33, Dec. 1971.*

Experiments carried out on a thermal afterburner in a surface-coating shop are described. The air, preheated in a heat exchanger, is admitted to the burning chamber through a burner, and is burned in the presence of natural gas or light oil. Turbulence is provided for complete combustion, and an average chamber temperature is stabilized by means of auxiliary energy. The burned gases are recycled to the heat exchanger. The air should be preheated to a temperature close to that required for complete combustion, and ignition is absolutely necessary. A minimum flame size, dependent on the preheat temperature, is necessary for the initial ignition, even if no auxiliary energy is needed. However, the pilot burner alone is not sufficient, even at extremely high preheating temperatures. The pilot flame distribution should be uniform as it affects the carbon monoxide content. The combustion quality, showing fluctuations of more than 50%, is strongly influenced by variations in the flame size. A minimum burning chamber temperature of 750 C is necessary to obtain pollutant concentrations below the odor threshold. The corresponding value for xylene is 710 C.

20434 APTIC NO. 39124

Zorrilla, Eduardo P.

PREDICTING AERODYNAMIC BEHAVIOR OF STACKS. *Oil Gas J., 69(44): 69-76, Nov. 1, 1971. 4 refs. (Presented at the American Society of Mechanical Engineers, Houston, Tex., Sept. 20, 1971.)*

Instability of cantilevered stacks and towers of circular cross section due to vortex shedding is a frequent phenomenon. When any cylinder obstructs the flow of air, vortices form on its surface. Changes in pressure associated with shedding of these vortices can generate the forces required to produce instability. A semiempirical method is presented to calculate the vibratory behavior of cylinders in order to investigate instability of these structures. Behavior calculated by this method is also compared with reported behavior of a number of structures. Two different types of vibratory motion have been attributed to vortex shedding: ovalling or breathing; and swaying or vibration as an elastic cantilever. Vibration criteria and frequency calculations are considered for swaying, as well as steps which may be taken if unacceptable vibratory behavior is predicted.

MEASUREMENT METHODS

20435 APTIC NO. 38835

MEASUREMENT UNITS FOR THE MAINTENANCE OF CLEAN AIR. *(Messgeraete zur Reinhaltung der Luft). Text in German. Planen-Pruefen- Investieren, no. 1:33-34, 1972.*

Practical application of the emission measurements focused on two components, carbon monoxide and sulfur dioxide. Through the limitation of the CO concentration in Otto engines in the idle condition to 4.5% by vol, selective CO analyzers became necessary. High-quality infrared analyzers were converted into handy portable units for this purpose. Units based on the same principle, however, with gas preparation auxiliary devices are used for monitoring the SO2 emission by boilers. In electrochemical measurements solid electrolytes have recently replaced the liquid electrolyte. The reaction of the component which is to be measured with the electrolyte produces an electric current which corresponds to the number of molecules participating in the reaction. By a combination of several such gas analyzers, whole grids can be erected for determining the environmental pollution of extensive areas.

20436 APTIC NO. 39136

Kanagawa Prefectural Government (Japan), Dept. of Pollution Countermeasures

ANALYTICAL METHOD RELATED TO ENVIRONMENTAL HAZARD. *(Kogai kankei no bunsekiho to kaisetsu). Text in Japanese. 122p.. Feb. 1972.*

Analytical methods which were adopted by the Center of Public Nuisance in Kanagawa Prefecture were explained. The analysis of soil, biological samples, exhaust gases, and metallic components in air were discussed. Items for analysis differed more or less by samples. In drainage, soil, and biological samples, the analysis of lead, cadmium, mercury, copper, zinc, iron, manganese, nickel, fluoride, chromium, arsenic, cyanide, and phenol and measurements of BOD, COD, and pH were discussed. In exhaust gases, the analysis of Cd, Pb, Cr, F, chlorine, CN(-), sulfur dioxide, total sulfur, hydrogen chloride, nitrogen oxides, ammonia, hydrogen sulfide, benzene, toluene, xylene, trichloro-ethylene, phenol, mercaptans, organic sulfides, and amines were discussed. The analysis of metalic components such as Cd, Cu, Pb, Mn, Ni, and Fe in air samples by the atomic absorption method was explained. It was emphasized that the above mentioned methods were adopted based on the experiments. Basic theories of simple methods of analysis were explained for beginners at the end of the report.

20437 APTIC NO. 39516

NOTIFICATION NO. 984. MEASUREMENT METHODS TO BE DETERMINED BY THE GOVERNOR AS SPECIFIED.... (Kokuji). Kanagawa-Ken Koho (Off. Gaz. Kanagawa Prefec.), no. 81:1-12, Nov. 10, 1971. Translated from Japanese. 57p.

Measurement methods for use under the Enforcement Regulations of the Kanagawa Prefecture Environmental Pollution Prevention Ordinance are presented. Atomic absorption photometry is described for the measurement of cadmium and lead compounds. The pyridine pyrazolene method is described for measurement of cyanogen, as well as an ion-electrode method. A diphenylcarbazide method is outlined for the determination of chromium, and a silver diethyldithiocarbamate method is indicated for arsenic. A reduction vaporization method of atomic absorption photometry is cited for total mercury, and gas chromatography with an electron capture-type detector can be used for measuring mercury alkyl contents. Phenol contents can be determined by a 4-aminoantipyrine method; copper, zinc, iron, and manganese by atomic absorption photometry; and chromium by the diphenylcarbazide method. Nickel can be determined by atomic absorption photometry, and a lanthanum-alizarin method can be used to measure fluorine content.

20438 APTIC NO. 39578

Japan Society for Analytical Chemistry, Tokyo

A REPORT OF RESEARCH FOR STANDARDIZATION OF THE METHOD FOR COLLECTING EXAUST GAS SAMPLES. *(Haigasu shiryo saishu hoho hyojunka no tameno chosa kenkyu hokokusho). Text in Japanese. 152p., 1969 (?).*

Standard methods for collecting gas samples are of great importance in the analysis of poisonous or harmful materials withi zexaust gases from smoke stacks and exaust pipes. The results may vary according to different positions for collection, different situations of inserted tubes for collection, various materials and length of the ducts, and whether the ducts are heated or unheated. Because of difficulties in determining these conditions, JIS also gives undefined presentations. The work of the Inquiry Commission on method standardization, the results of questionaires concen½ing methods for sampling in factories and business offices; tests for the absorption efficiency of sulfur dioxide and its solubility in water; model plant tests using gases at normal temperature and heated gases; and the methods for collecting exhaust gases in sulfuric factories, iron ore sintering furnaces, and steam-power plant boilers are outlined.

20439 APTIC NO. 39692

DUST MEASUREMENT IN BLAST FURNACE GAS. *Iron Coal Trades Rev., vol. 168:220, Jan. 22, 1954.*

A continuously recording instrument which monitors gases from blast furnaces is described. The instrument comprises four main components: a sampling chamber with photoelectric cells, light source, and an optical system; a thermionic value amplifier, together with its stabilizer, power supplies, and setting-up controls; a 7-inch diameter indicator-relay meter incorporating a small contactor for connection to an alarm system; and a continuous 3.5-inch wide strip recorder. The instrument works on the light scattering technique. Blast furnace gas is taken from the main, raised above the dew point by preheating it with steam coils, and fed through the viewing chamber. After recording the dust concentration, it is then either injected back into the gas main by an impeller, or exhausted to the atmosphere. To prevent aggregation of the particles, the design of the sampling tube incorporates smooth bends, gate-type valves, and a thin-walled receiving tube. Gas velocities in the main stream are measured, and the flow rate in the sampling by-pass controlled, by an orifice plate which ensures that a correct comparative reading of the dust concentration is obtained.

20440 APTIC NO. 39757

ASTM STUDY WILL EVALUATE STACK-EMISSION TEST METHODS. *Chem. Eng., 79(9):30, 32, May 1, 1972. 2 refs.*

Industrial testing teams are moving into final preparations for a carefully coordinated stack emissions testing project. The objective is to find out how precisely measurements can be made of particulate matter, collected residue, stack gas velocity, total oxides of sulfur and nitrogen, and opacity, Slated to begin in July 1972 and to take about 6 months, the program is Phase Two of the American Society for Testing and Material s Project Threshold. Eight sources will be selected for study from such major categories as industrial incinerators and boilers, power plants, cement plants, fertilizer plants, smelters, and sulfuric acid plants. Eight testing teams will, in units of up to four at a time, make week-long field tests of the selected stacks. The test methods that will be employed are indicated. Nitrogen oxides, except nitrous oxide, are absorbed and measured colorimetrically with phenol-disulfonic acid. Sulfur dioxide is determined by barium chloroanilate titration, and particulates are collected with an impinger. Phase Two will evaluate the Ringelmann method for opacity and the pitot tube for velocity.

20441 APTIC NO. 39244

Adamiak, J.

COLORIMETRIC DETERMINATION OF CYCLOHEXANONE IN THE PRESENCE OF ACETONE IN AIR. *(Kolorymetryczne oznaczaniecykloheksanonu w obecnosci acetonu w powietrzu). Chem. Anal. (Warsaw), 13(4):895-900, 1968. 8 refs. Translated from Polish. National Leading Library for Science and Technology, Yorkshire (England), Russian Translating Programme, 9p.*

The colorimetric determination of cyclohexanone in the presence of acetone in air is described. Both cyclohexanone and acetone are used in the paint and lacquer industry as a solvent for nitro and polyvinyl paints, and both occur simultaneously in solvent-polluted air. The method is based on the coupling of cyclohexanone with a diazonium salt of hydrogen acid in an alkaline medium of sodium hydroxide and sodium sulfite or bisulfite. Absorption determinations are carried out by spectrophotometry.

20442 APTIC NO. 39146

Ahlmark, Axel, Allan Danielsson, Gideon Gerhardsson, and Bertil Lindvall

PROCEDURE FOR THE SEPARATION OF SILICOGENOUS DUSTS. *(Verfahren zur Abtrennung silikogener Staeube). Text in German. Staub, Reinhaltung Luft, 32(3):105-108, March 1972. 3 refs.*

A method for separating silicogenous dust samples, e.g., quartz, in different grain classes for further analysis is examined. Liquid elutriation was used to separate dust that could cause silicosis. The fine fraction was used for x-ray diffraction analysis. The elutriator gave significantly more defined separations than the Andreasen method. A scanning electron microscope was used to study particle size distribution of the fine and coarse fractions.

20443 APTIC NO. 38990

Alex, W.

PRINCIPLES AND CLASSIFICATION OF COUNTING METHODS IN PARTICLE SIZE ANALYSIS. PART 1. *(Prinzipien und Systematik der Zaehlverfahen in der Teilchengrossenanalyse. Teil 1). Text in German. Aufbereitungs-Technik, no. 2:105-111, 1972. 40 refs.*

Counting methods play an important role in particle size analysis, especially since quantitative television microscopes, the Coulter counter, and light-scattering equipment enable quick performance. The principles of counting methods are surveyed and classified. The indirect (imaging) methods use macroscopic and microsopic photography, transmission and scanning electron microscopy, electron probe X-ray microanalysis, micrometers and graticules, the Zeiss TGZ 3, quantitative television microscopes such as the Quantimet 720, the Classimat, the Micro-Videomat, the PiMC System, the Phase Integrator, the Zeidler counter, and holography. The direct methods are divided into mechanical counting and counting of field disturbances, the fields being either electrical (Coulter counter), aerodynamical (Langer counter) or optical (Schleusener counter, flow photometers, and scattered-light and spectrothermal counters).

20444 APTIC NO. 39239

Allen, Nelson and N. Howell Furman

DETERMINATION OF FLUORINE BY PRECIPITATION AS TRIPHENYLTIN FLUORIDE. *J. Am. Chem. Soc., vol. 54:4625-4631, Dec. 1932. 16 refs.*

Fluorine determination through quantitative precipitation as triphenyltin fluoride is examined. The method is suitable for small quantities of fluorine (below 0.04 g) but has several disadvantages in that the reagent is uncommon and expensive, is insoluble in water, and is slightly soluble in alcohol. Large amounts of foreign salts may also cause co-precipitation of the reagent and give high results. Advantages include the crystalline form of the precipitate for easy filtering and quick washing, stability, and speed. Experimental procedure and treatment are discussed.

20445 APTIC NO. 39243

Allen, Nelson and N. Howell Furman

A POTENTIOMETRIC TITRATION METHOD FOR FLUORINE. *J. Am. Chem. Soc., vol. 55:90-05, Jan. 1933. 16 refs.*

A method for fluorine determination is described involving the precipitation of cerous fluoride through a new application of the ferriferrocyanide electrode. The method gives good results for fluorine concentrations within 0.1-50 mg. Small amounts of foreign salts may be present, but too large amounts mask the equivalence point. Ions which precipitate cerous cerium must be absent. Experimental procedures and results of fluorspar analysis are discussed. (Author summary modified)

20446 APTIC NO. 38793

Ashenfelter, T. E. and K. Telegadas

COMPARISON OF THE ORIGINAL AND MODIFIED HIGH-VOLUME-3000 AIR EJECTOR SAMPLERS. *Health Safety Lab., no. 246:53-68, Jan. 1, 1972. 6 refs.*

A modification of the High-Volume-3000 air ejector sampler (HV3K) was developed and flight tested against an original HV3K sampler. The original sampler became contaminated with radioactive debris during its ascent to sampling altitude, while the modified HV3K sampler is considered to be contamination-free durings its ascent to sampling altitude. The sampling doors of the HV3K were redesigned and connected to pneumatic actuators and are now in a closed position during ascent. At sampling altitude the high pressure air ejector pump gas supply is turned on which operates the actuators to open both doors simultaneously and also causes the air ejector to pull air through the filter paper. At termination of sampling, the gas supply is turned off and a tight closure of the inlet and outlet doors is assured by the return spring within the pneumatic actuator. To equalize pressure between the inside of the module and the ambient air, a pressure relief port was installed. (Author abstract modified)

20447 APTIC NO. 39105

Beard, H. Richard

CONDUCTIVITY CELL APPARATUS FOR CONTINUOUS MEASUREMENT OF SULFUR DIOXIDE CONCENTRATIONS BETWEEN 40 PPM AND 1 PER CENT. *Anal. Chem., 44(6):1104, May 1972. 2 refs.*

An inexpensive and reliable conductivity cell using hydrogen peroxide as the absorbing reagent is used to measure sulfur dioxide concentrations at less cost to the user than commerical instruments currently available. The SO2, at concentrations of 40 ppm to 1% in the off-gas of an SO2 removal system, must be monitored continuously in the presence of normal atmospheric gases and combustion products. The instrument and systems for controlling the liquid and gas flows to obtain reproducible and reliable measurements of SO2 concentrations are described. (Author introduction modified)

20448 APTIC NO. 39424

Beardsley, C. W. and N. J. Krotinger

EVALUATION OF ODORS. *Sewage Ind. Wastes, 27(2):157-160, Feb. 1955. 1 ref.*

Collection of sewer gases in polyethylene bags provides a convenient procedure for obtaining ratings of sewer odors and the effects of odor treatment from a panel of observers. Advantages of the method are that the rating can be made away from the odor source to eliminate olfactory accommodation and that untreated gas can be stored for ready comparison with the odor after treatment. Also, threshold concentrations are easily determined by expelling a fixed amount of the gas and reinflating with fresh air.

20449 APTIC NO. 38943

Beck, R. and W. English

AIR POLLUTANT EMISSION AND IMMISSION MEASUREMENTS BY MEANS OF LASERS. *(Emissions- und Immissionsmessungen von Luftverunreinigungen mittels Laser). Text in German. Preprint, Battelle Inst. e.V., Frankfurt Am Main (West Germany), 23p., 1972. (Presented at the Fachtagung Umweltverschmutzung, Frankfurt/Main, March 21-24, 1972.)*

There are three optical-spectroscopic methods for gas analysis which are explained in greater detail. They are the measurement of Raman scattering, resonance fluorescence, and resonance absorption. For the measurement of Raman scattering, very strong lasers are required. With the strongest laser available the distance which can be bridged for measurements is less than 10 m. The same holds for the measurement of resonance fluorescence. The measurement of resonance absorption is superior to the other two methods as far as distance and sensitivity is concerned. The lasers available for gas analysis include the gas laser (active media are either a molecular gas, a neutral gas, or ions) the solid state laser (e.g., pulsed ruby laser), dye laser, semi conductor laser, and the parametric oscillator. Decisive for application of one of the three methods is the permeability of the atmosphere for the used wavelength. The permeability is limited by Rayleigh and Mie scattering and by losses through absorption. The latter is avoidable. Illustrations of possible arrangements for the analysis of gases by means of lasers are given. Absorption measurements of methane with a laser were carried out. The natural concentration of methane in the atmosphere (about 1.4 ppm) could still be measured. The gas volume necessary for the analysis was only 100 ccm. The method of comparative remote analysis has made world-wide pollution measurements feasible by putting the laser into a satellite.

20450 APTIC NO. 38808

Bernert, J.

SPECIAL METHODS FOR THE DETERMINATION OF INTENSELY ODOROUS COMPOUNDS CONTAINED IN WASTE GASES. *(Spezielle Methoden zur Bestimmung geruchsintensiver Stoffe in Abgasen). Text in German. Preprint, 15p., 1972. 1 ref. (Presented at Umweltverschmutzung, Frankfurt, West Germany, 1972.)*

Different methods and devices used in subjective olfactometry and objective concentration measurements are reviewed. Olfactometers which produce different degrees of dilution generally use Klein s odor standards. In scentometers the odorous substances pass through an activated carbon bed. In the ASTM method, the amount that is just perceptible when diluted to 1 cu ft is termed an odor unit. In concentration measurements, elements are determined for odorous mixtures with many known and/or unknown components. The total carbon concentration is determined for combustible organic mixtures by the Ixfeld-Buck method. The samples are desorbed on a platinum contact of about 800 C to form carbon dioxide and water. Carbon dioxide is determined by titration or electrolytic procedure. A simple method using vapor distillation and hydrochloric acid titration has been developed for ammonia, methylamine, and ethylamine. Direct colorimetric determination using the indophenol blue technique is also possible. For amines, the subjective odor intensity is nearly proportional to the length of the carbon chain. Hydrogen sulfide as a single component in waste gases can be precipitated as sulfate or cadmium sulfide, however, the reactions of cadmium sulfide with copper sulfate or iodine solution yield better results. For the joint determination of hydrogen sulfide and sulfur dioxide, H2S and total sulfur are determined separately.

20451 APTIC NO. 38745

Blacker, J. H. and R. S. Brief

EVALUATION OF THE JACOBS-HOCHHEISER METHOD FOR DETERMINING AMBIENT NITROGEN DIOXIDE CONCENTRATIONS. *Chemosphere, 1(1):43-46, Jan. 1972. 4 refs.*

The efficiency of the Jacobs-Hochheiser method was tested on dynamically prepared nitrogen dioxide concentrations. The uniform collection efficiency of 35%, specified by the Environmental Protection Agency as a standard, was not supported by tests, since the efficiency of the method, using one absorber, was concentration dependent. The collection efficiency of 35% was estimated to occur only at 0.215 ppm NO2 which is well above the proposed standard of 0.05 ppm. At this concentration, efficiency was 65%. The method can be applied if two absorbers in series are used to sample the ambient NO2; an average efficiency of 73.7% was obtained in tests at different concentrations. (Author conclusions modified)

20452 APTIC NO. 39395

Bonzel, J. and J. Hodeau

CONTROL OF BACTERIOLOGICAL POLLUTION OF THE AIR. *(Controle de pollution bacteriologique de l air). Text in French. Ann. Fal. Expert. Chim., 64(693):9-13, Jan.-Feb.-March 1971.*

A new technique for the identification and quantitative determination of microbes, molds, and fungi in the air is described. A definite air sample volume is bubbled through a liquid (sterile water or two different Brain Heart solutions) at a rate of 12.5 l/min, and the liquid is filtered by means of a cellulose ester filter. The microorganisms, cultivated on the latter filter, are identified by transfer, and counted following coloration. Two separate samplings are usually necessary for bacteria and fungi, respectively. The above method is of fairly high precision.

20453 APTIC NO. 39428

Byrd, J. F.

DEMONSTRATION -- SYRINGE ODOR MEASUREMENT TECHNIQUE. *J. Air Pollution Control Assoc., 7(1):58-59, May 1957. (Presentat at the Metropolitan Cincinnati Conference on Air Pollution Control, Cincinnati, Ohio, Oct. 24, 1956.)*

The use of medical syringes in odor concentration measurements provides a means for diluting odors to threshold levels with a measurable amount of clean air. So that odorous materials can be withdrawn from deep within a stack or duct, a sampling syringe is provided with a 1.5-3 in. needle. After the sample is taken, the syringe is capped and carried to an odor-free room, where the odorous material is transferred to a dilution syringe for mixing with clean air. The intensity of the odor is determined by the dilution required to reach threshold. The precision and accuracy of the method depend on the number of persons on the odor panel and the experience and skill of the observers. Every single observer should be able to attain results that are 50% reproducible on any given day.

MEASUREMENT METHODS

20454 APTIC NO. 39399

Chatot, G., M. Jay, W. Jequier, and R. Fontages

PURIFICATION OF ATMOSPHERIC POLYCYCLIC AROMATIC HYDROCARBONS BY THIN-LAYER CHROMATOGRAPHY. *(Purification des hydrocarbures aromatiques polycycliques de l atmosphere par chromatographie sur couches minces). Text in French. Chim. Anal. (Paris), 52(11):1264-1269, Nov. 1970. 18 refs.*

A technique for the separation of polycyclic aromatic hydrocarbons from atmospheric dust by thin-layer chromatography is described. The four different systems of thin-layer chromatography were checked by gas chromatography and mass spectrography. The 800 mg organic fraction, obtained from a dust sample of 20 g by Soxhlet extraction, was composed of aromatic polycylic, heterocyclic, and aliphatic hydrocarbons. The total of the fluorescent polycyclic hydrocarbons was separated, and a considerable proportion of aliphatic hydrocarbons was eliminated in the first system (preparative chromatography; adsorbent: silicagel-cellulose; solvents: pentane-ethylether). The fluorescent hydrocarbons were then separated in two zones in the second system (bidimensional chromatography; adsorbent: silicagel-cellulose; solvents: pentane-ether and dimethylformamide- water, respectively). The polycyclic aromatic fraction from the above separation was further purified in the third system (bidimensional chromatography; adsorbent: aluminum oxide-cellulose acetate; solvents: pentane and ethanol-toluene-water, respectively). Gas chromatography revealed a considerable proportion of aliphatic hydrocarbons being eliminated. Despite the massive elimination of the above hydrocarbons in the fourth system (preparative chromatography; adsorbent: silicagel-cellulose; solvents: pentane-ether), paraffin traces, probably long-chain alkylbenzenes, were detected by mass spectrography. The total output of the above separation technique can be regarded as satisfactory as the outputs from the four respective systems were 260, 90, 8, and 6 mg.

20455 APTIC NO. 39245

Ciuhandu, G., V. Rusu, and M. Diaconovici

DETERMINATION OF CARBON MONOXIDE TRACES IN OXYGEN. *(Bestimmung von Kohlenmonoxidspuren in Sauerstoff). Text in German. Z. Anal. Chem., 208(2):81-86, Jan. 15, 1965. 11 refs.*

Carbon monoxide determinations were carried out in gaseous mixtures with pure air, by reaction with an alkaline solution of the silver compound of p-sulfamylbenzoic acid. The reduction of this reagent by CO to a yellow to greyish-brown silver sol is not affected by oxygen. Under the proper conditions the reaction can satisfactorily be employed in the determination of traces of CO in oxygen up to concentrations of about 10 ppm.

20456 APTIC NO. 39781

Coleman, R. L., W. D. Shults, M. T. Kelley, and J. A. Dean

ENVIRONMENTAL APPLICATIONS OF PARALLEL PHOTOMETRIC ANALYSIS. THE DETERMINATION OF SULFUR DIOXIDE. *Anal. Letters, 5(3):169-176, 1972. 9 refs.*

Experimental procedures, apparatus, reagents, and results of sulfur dioxide measurements by parallel photometric analysis are examined. A combined centrifugal photometric analyzer/West and Gaeke procedure was used to establish the analytical performance of the parallel determinations, to determine the feasibility of external calibration, to ascertain the optimum time for absorbance measurements, and to determine the long-term performance characteristics of the procedure. Calibration curves were virtually linear after 3 min and should be run with each set of samples. A three minute delay in measurement time improved precision. The accuracy and precision was about 1% at the 1 microgram/ml level. Long and short-term performance levels were comparable.

20457 APTIC NO. 39539

Crocker, E. C. and L. B. Sjostrom

ODOR DETECTION AND THRESHOLDS. *Chem. Eng. News, 27(7):1922-1925, July 4, 1949. 9 refs. (Presented at the Conference on Air Pollution, Manufacturing Chemists Association, New York, April 19-20, 1949.)*

From a practical standpoint, odor is nasal stimulation caused by certain kinds of molecules dispersed in air. It may be reasoned that odor is a molecular property, for molecular dispersion is the only general type of gaseous dispersion which is possible in air; also, every slightest change in molecular constitution or configuration is attended by odor difference. There are chemical theories of odor perception which postulate that some kind of chemical action takes place at or near the sensory nerves to make detection possible. Many physical hypotheses have also been advanced to account for odor perception. One, which assumes a similarity between smell and sight, postulates a nasal analog of the visual purple of the eye, which is activated by some kind of short-range electromagnetic radiations from the odoriferous molecules. In a new theory of sensory cell stimulation, the sensory cells are conceived of as masses of protoplasm, extending into the air space in the nose, each enclosed by a semipermeable protein skin or membrane. A change in cell electrification may be produced if any molecules outside the cell disturb the orientation of the protein dipoles. Infrared spectrometry, mass spectrometry, electronic halogen detection, and hygrometry are indicated as physical means of odor detection. Chemical methods are also noted. Where the quantity of odorant in the air is very low, it may sometimes be concentrated by accumulation over a period of time. The determination of odor threshold limits is discussed.

20458 APTIC NO. 39103

Dams, Richard, Kenneth A. Rahn, and John W. Winchester

EVALUATION OF FILTER MATERIALS AND IMPACTION SURFACES FOR NONDESTRUCTIVE NEUTRON ACTIVATION ANALYSIS OF AEROSOLS. *Environ. Sci. Technol., 6(5):441-448, May 1972. 11 refs.*

Ten filter materials were tested for their suitability for atmospheric particulate sampling and elemental analysis by nondestructive neutron activation using germanium(lithium) gamma-ray spectroscopy. Trace element content in most materials are high and are often the principal limitation in analytical sensitivity. Of the commerically available filters tested, Whatman 41 cellulose has the lowest analytical blanks but may clog during prolonged sampling. For some elements, Millipore membrane filters have low blanks but tend to disintegrate during neutron irradiation Special polystyrene fiber filters may have low blanks and excellent particle retentivity but are fragile. Of commerically available filters, Whatman 41 is optimum from the standpoints of low blanks, particle retentivity, and ease of handling. (Author abstract)

20459 APTIC NO. 39390

Debrun, M.

ATMOSPHERIC POLLUTION MONITORING AROUND A LARGE-CAPACITY THERMAL POWER PLANT OF E.D.F. *(La surveillance de la pollution atmospherique autour d une grande centrale thermique E.D.F.). Text in French. Rev. Ass. Fr. Tech. Petrole, no 209:103-110, Sept.-Oct. 1971. (Presented at the International Congress on Pollution, Dec. 1970.)*

The air pollution monitoring network covering the thermal power plants of E.D.F. is described, and some measurement data are reproduced. The sulfur dioxide concentrations are continously measured by bubblers which contain hydrogen peroxide adjusted to pH 4.5. An evaporation losses are compensated for, the amount of sodium borate (Na2B407) added to stabilize the pH value is a measure of the sulfur dioxide concentration in the air. The data are transmitted to a center for evaluation and warning the power plants whenever necessary. Peaks in acid pollution can be avoided by the above monitoring system, since the power plants are required to use low-sulfur fuels in case emergency. The duration of the limitations in the use of normal fuel may range from 1% to 10%, for which sufficient stocks of low-sulfur fuel are available.

20460 APTIC NO. 39626

Dodd, A. E. and Z. Holubecki

THE MEASUREMENT OF DIESEL EXHAUST SMOKE. *Motor Industry Research Association, Nuneaton (England), MIRA Rept. 1965/10, 28p., April 1965. 6 refs.*

Performance characteristics of the Hartridge-BP and Dunedin (Bosch) smokemeters were investigated and, in order to provide an absolute scale to which smoke emissions could be referred, a gravimetric sampling technique was developed and the readings of the two meters related to the weight of solids in a unit volume of exhaust. Three engine ranging from 1.6 to 6.75 l, and two vehicles tested on a chassis dynamometer and having engines of 2.2 and 5.4 l respectively, were used. The full range of engine speeds and loads were covered with each unit. Sampling techniques for both smokemeters were investigated and test procedures revised in the light of the results obtained. In general, most of the sampling troubles encountered with the Hartridge smokemeter can be eliminated by sampling downstream of the silencer. If this is not possible, a damping chamber installed in the sample line near the probe will give accurate results. Mean correlation curves were obtained between the two smokemeters and between each smokemeter and the gravimetric measurement of exhaust smoke density. The scatter of points about the correlation curves is appreciable, and different correlations can be obtained for each engine and also for each speed with any engine. A single correlation must, of necessity, be a compromise for the majority of engines. The effect on smokemeter correlation of faulty injection timing was also demonstrated. The need for a procedure to test the Dunedin pump and sample line for leakage was demonstrated during the investigation, and tests were carried out to determine the limits of acceptability. A simple checking procedure is proposed. Photographs of smoke particles and agglomerates from three engines are presented to illustrate the difference in smoke produced. These photographs may help to explain the subjective acceptability of higher levels of smoke density from small engines. (Author summary modified)

20461 APTIC NO. 39760

Downs, W. and S. S. Strom

NEW PARTICLE SIZE MEASURING PROBE--APPLICATION TO AEROSOL COLLECTOR AND EMISSIONS EVALUATIONS. *Trans. ASME (Am. Soc. Mech. Engrs.), 94(2):117-126, April 1972. 9 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/PTC-7.)*

A basic parameter needed for judicious design, selection, and regulation of industrial gas cleanup equipment is particle size distribution of gas-borne emissions. Despite the importance of this parameter, a cloud of uncertainty about the validity of present methods used for particle size distribution measurements has produced a technological gap. An apparatus and method are described which are capable of bridging this gap. Particle size distribution data obtained, particularly in the near micron and submicron range, can provide means for determining grade efficiencies of dust collectors, expected opacity of stack emissions, and dispersion characteristics of plumes. The apparatus described was developed for manual sampling and size distribution determination of aerosols within industrial flues and stacks. The entire apparatus is contained within a sampling probe, and its principal component is a cylindrical cascade impactor. Design of the probe eliminates most of the technical difficulties associated with previous attempts at implementing cascade impactors to this task. This probe has been used successfully for sampling gases up to 450 F. (Author abstract modified)

20462 APTIC NO. 39479

Dravnieks, Andrew

ODORS: THEIR NATURE, MEASUREMENT, AND CONTROL. *Missouri Univ., Columbia, Coll. of Engineering and Missouri Air Conservation Commission, Jefferson City, Control Dusts, Smokes, Noxious Odors, Proc. Annu. Air Pollut. Conf., 3rd, Columbia, Mo., 1970, p. H1-H15. 19 refs. (Nov. 17.)*

Odor intensity and threshold measurement methods are reviewed. A widely used method for odor intensity characterization is category scaling. More accurate odor intensity measurements can be obtained using odor intensity reference sets. Reference scales permit establishing to what extent the odor intensity of an odorant s vapor or an odorous effluent decreases with dilution by air. The odorants responsible for the odor can be analytically detected and their concentrations measured. However, the sensitivity of the measured nose imposes certain requirements in the selection of analytic methods. At present, the methods of choice are gas chromatographic separations of odorous components with appropriate detectors used to detect the separated components. Hydrogen flame ionization detectors which detect almost all organic compounds, flame-photometric detectors for sulfur compounds, and a Coulson conductometric detector for nitrogen compounds all have a sensitivity of the order of 10 to the minus ninth g per component. Correlations exist between some physico-chemical properties of odorants and such sensory parameters as thresholds, intensity increase with concentration above threshold, odor similarities, and even hedonic rating. The physico-chemical properties involved are molvolumes of the odorants, hydrogen bonding ability, and polarizability of the higher polarizable part of the odorant molecule.

20463 APTIC NO. 39761

Ebens, Rinze and Peter Bernard Meyer

A COMPARISON OF PARTICLE COUNT CONCENTRATIONS AS OBTAINED BY MEANS OF THERMAL PRECIPITATOR AND LONG-PERIOD THERMAL PRECIPITATOR. *(Vergleich der mit dem Thermalpraezipitator und dem Langzeit-Thermalpraezipitator gefundenen Ergebnisse der Teilchenzahl-Konzentration). Text in German. Staub, Reinhaltung Luft, 31(6):249-252, June 1971. 5 refs.*

Concentration measurement data obtained by means of a thermal precipitator and a long-period thermal precipitator in dust chamber and foundries were compared in order to obtain correlations for both instruments. Four-minute samplings were applied in the dynamic dust chamber with constant dust concentration to avoid errors due to overlapping. The reproducibility errors for the thermal precipitator and the long-period thermal precipitator were about 25% and 20% respectively. Linear relationship between the averages of the results of the thermal precipitator and the long-period thermal precipitator was established. A standard deviation of 15% and a correlation factor of 0.96 were found. A factor of 1.09 indicates a deviation of 9% from an ideal relationship between thermal precipitator and long-period thermal precipitator, due to the dead volume characteristic of the latter. The correlation factor for the relationship of the measurements in the foundries was 0.9. Since the differences in the grain size distribution were insignificant (secured for 95%), the efficiency of the two different precipitators can be regarded as nearly equal.

20464 APTIC NO. 38761

Eddy, David S.

METHOD AND APPARATUS FOR MONITORING EXHAUST GAS. *(General Motors Corp., Detroit, Mich.) U. S. Pat. 3,616,274. 6p., Oct. 26, 1971. 5 refs. (Appl. Nov. 24, 1969, 5 claims).*

A solid electrolyte, electrochemical exhaust gas sensor is described which is self-correcting with respect to maintaining its operating temperature substantially constant. The sensor comprises two electrochemical cells sharing a common electrolyte but externally loaded differently to produce different terminal voltages. An electronically detected imbalance between the two voltages produces a thermal correction signal which activates appropriate heating or cooling means. The sensor is particularly adapted to sensing the composition of internal combustion engine exhaust gases. (Author abstract modified)

20465 APTIC NO. 39212

Engen, Trygg

METHOD AND THEORY OF ODOR PREFERENCE. *Preprint, Environmental Protection Agency, Washington, D. C., 33p., 1971. 22 refs. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reaction to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

The hedonics of odor perception within the general context of method and theory of odorimetry are examined. The most important change with age is not odor preference, but a tendency to acquiesce, i.e., to agree that an odor smells good regardless of its hedonic value. Such false positives probably depend on both the method and the age of the child. The preference scale for children is the same as that for adults, but the differences in values on the hedonic scale for the same odorants become smaller as the age of the children decreases. A study with adults revealed that whether an odor is pleasant or unpleasant depends to a large extent, perhaps primarily, on whether the person is familiar with the odor. The study of odor preferences should be considered in the light of the kind of learning paradigms that may explain how they are acquired. Classic conditioning and social imitation would seem to account for most instances. In addition to the obvious effects of advertising, imitation and guidance may play a major role. The question of meaning has been approached by psychologists through methods of free association, the semantic differential, and other scaling techniques.

20466 APTIC NO. 39611

Fox, E. A. and V. E. Gex

PROCEDURE FOR MEASURING ODOR CONCENTRATION IN AIR AND GASES. *J. Air Pollution Control Assoc., 7(1):60-61, May 1957. (Presented at the Conference on Air Pollution Control, Cincinnati, Ohio, Oct. 25, 1956.)*

A new method of measuring odor concentrations in air or gases is based on diluting the sample with odor-free air to a point where the odor is barely perceptible (odor threshold). The ratio of the total volume of the diluted sample to the volume of the original sample in the diluted sample is the measure of odor concentration in the original sample. The method will determine odor concentration in gases discharged from industrial process operations and the odor emission rate from a stack or vent. Also, odors from two or more different sources, or from the same sources under different operating conditions, can be compared. The precision and accuracy of the method depend on the physical condition, experience, and skill of the observer. On any given day, a single observer should be able to obtain results that are reproducible within plus or minus 50%. Where greater accuracy is desired, more observers should be used and their results averaged.

20467 APTIC NO. 39645

Franklin, A. D., R. Campbell, and J. Weinmann

MEASUREMENT OF PARTICLE SIZE OF FINE FERROMAGNETIC POWDERS. *J. AAppl. Phys., 24(8):1040-1045, Aug. 1953. 26 refs. (Presented at the Electron Microscope Society of America, Annual Meeting, 10th, Cleveland, Ohio, Nov. 6, 1952 and at the American Physical Society, Durham, N. C., March 1953.)*

The particle sizes of four iron and two iron-cobalt powders with diameters ranging from 200 to 600 A were determined using an electron microscope, x-ray line broadening, and nitrogen adsorption techniques. Reasonable agreement was found between the, electron microscope and the x-ray methods, while the sizes determined through nitrogen adsorption were in every case larger. A method of dispersing single-domain ferromagnetic powders for electron microscopy is described. (Author abstract modified)

20468 APTIC NO. 39674

Friedel, R. A.

SPECTROMETRIC ANALYSES: APPLICATION TO ATMOSPHERIC POLLUTANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 222-227. 7 refs. (May 3-5, Louis C. McCabe, ed.)*

Experience with spectrometric analysis of alkyl phenols from coal hydrogenation oils and of oxygenated components such as simple alcohols and ketones is briefly described, and data from the mass spectrometer analysis of decomposition products from the uncatalyzed pyrolysis of methane and the reaction of methane and steam are given. In connection with a study of the cause of eye irritation in Los Angeles, results of mass and infrared spectrometric analysis of condensated from freeze-out traps after carbon disulfide extraction are summarized. In such analyses, the sampling method is of major importance. An activated charcoal scrubber used in connection with the mass spectrometer may circumvent many of the drawbacks of the freeze-out train. Tests of scrubber function are reported.

20469 APTIC NO. 38778

Frigieri, Paolo, Renato Trucco, Renato Anzani, and Eraldo Caretta

SPECTROSCOPIC ANALYSIS OF ELEMENTS PRESENT IN AIRBORNE MATERIALS. *(Analisi spettroscopica di elementi presenti nel pulviscolo atmosferico). Text in Italian. Chem. Ind. (Milan), 54(1):12-17, Jan. 1972. 8 refs. (Presented at the Seminar on Spectrochemistry, 16th, Sirmione, June 9-12, 1971.)*

X-ray fluorescence spectrometry was applied to develop a procedure for the direct quantitative analysis of airborne dusts. Dust samples were collected by volume measuring aspirators on millipore filters. Qualitative analysis revealed the presence of vanadium, chromium, lead, manganese, aluminum, iron, titanium, nickel, zinc, silicon, sulfur, sodium, calcium, bromine, potassium, chlorine, and copper in the above samples. Calibration curves for quantitative X-ray fluorescence spectrometry were developed using external standards and taking into account the variation of spectral response with the dust layer thickness (for same amount of analyzed element). Related background corrections (blank) were made. Standard samples for quantitative emission spectrography were prepared mixing spectroscopically pure oxides of the related elements with Ringsdorff graphite and gallium oxide as an internal standard. Analytical samples were prepared by dissolving the millipore filter, carrying the dust sample, in acetone. An aliquot of the centrifuged particulate matter phase was then treated with graphite and Ga2O3. A graphite rod was used as an opposite electrode. Comparison of the two analytical methods indicated X-ray fluorescence spectrometry to be a valid technique to be applied for the direct analysis of air pollution.

20470 APTIC NO. 38812

Frostling, H. and A. Brantte

A MOBILE ANALYSIS INSTRUMENT FOR THE MEASUREMENT OF ORGANIC VAPOURS AND AEROSOLS IN AIR. *J. Sci. Instr., 5(3):251-253, March 1972. 8 refs.*

An apparatus is described for continuous measurements of hydrocarbons in air. The sample, vapors as well as aerosols, is analyzed in a flame ionization detector of a special design, which works at a reduced pressure. To achieve this, a carbon dioxide driven aspirator is utilized as suction pump. The detector is thermostatically controlled by combustion of hydrogen gas in a catalytic heater. The instrument is independent of electric current sources, apart from some common dry cells for the electrometer and the recorder. The build-in gas containers give the apparatus an operation time of 24 hours. The sensitivity for gaseous hydrocarbons and aerosols is about 0.05 mg/cu m for most hydrocarbons. (Author abstract)

20471 APTIC NO. 39294

Gant, V. A. and H. D. Shaw

ODOR CONCENTRATIONS IN AIR-CONDITIONED STRUCTURES. DETERMINATION BY THE FREEZING OUT AND OSMOSCOPE METHOD AND REDUCTION BY ACTIVATED CARBON. *Ind. Eng. Chem., 9(1):16-18, Jan. 15, 1937. 2 refs.*

A freezing-out method was developed for determining the concentration of odors in air-conditioned structures. Solid carbon dioxide, contained in a properly insulated box, was the refrigerant used to freeze out moisture and odor in an efficient condenser tube through which measured amounts of air were drawn at low velocity. Liquid air was not used on account of the expense and danger involved. The relative odor value of the condensate was determined with an osmoscope and verified by quantitative chemical determinations. Odors in an air-conditioned structure were removed efficiently and economically by activated carbon filters. (Author summary modified)

20472 APTIC NO. 39620

Gex, V. E. and J. P. Snyder

NEW DEVICE, WIDER CONCEPT HELPS TO MEASURE ODORS QUANTITATIVELY. *Chem. Eng., vol. 59:200-201, 372, 374, Dec. 1952. 1 ref.*

A new odor-testing device mixes odorous air with fresh air, purified in an activated carbon chamber, in slowly increased proportions until the threshold is reached. This makes the human operator much more sensitive to the threshold than would be the case if the odorous air were diluted with increasing volumes of fresh air. By using the odor threshold point to relate odor quantity to the sense of smell, it is possible to define a unit of odor quantity as the amount of odorous material that will contaminate 1 cu ft of air to the threshold point. Applications of the unit include determination of the quantitative odor reduction brought about by removal equipment like furnaces, activated carbon units, and venturi scrubbers. It can also be used to compare emission rates of various odor sources in a plant and to evaluate dilution effects obtained by stacks. The device has a wide range of intensities (1:1 to 500:1) with a continuous scale, continuously flushes the odor chamber, can be used for process ducts under normal fan suction or pressure, and is semi-portable and rapid to operate. However, it is somewhat erratic with high-moisture exhausts, does not determine odor quality, needs a power supply, and is expensive.

20473 APTIC NO. 39633

Green, Henry L.

ON THE APPLICATION OF THE AITKEN EFFECT TO THE STUDY OF AEROSOLS. *Phil. Mag., 4(7):1046-1069, Nov. 1927. 15 refs.*

Theoretical considerations underlying the application of the Aitken effect are discussed. The method of directly counting particles in aerosols was based on that developed by Zsigmondy for obtaining the number of particles in colloidal solutions. The original procedure adopted by Whytlaw-Gray was to pass a slow stream of the aerosol through an ultramicroscope cell illuminated by a beam of light of known depth. The particles were viewed through a microscope in which field of vision was cut down by a square diaphragm in the eyepiece, so that the number of particles seen at any moment could be estimated at a glance. Then a method was developed of photographing the droplets formed in a mechanical or continuous action Wilson apparatus and of counting their images on the negative with a low-power microscope. A continuous action Wilson apparatus to be used with the photographic method is described, including its application to a study of ammonium chloride and cadmium oxide clouds.

20474 APTIC NO. 39344

Greenfield, Stanley M.

MONITORING THE ENVIRONMENT. *J. Assoc. Offic. Anal. Chemists, 55(2):235-238, March 1972. (Presented at the Association of Official Analytical Chemists, Annual Meeting, 85th, Washington, D. C., Oct. 11-14, 1971.)*

The extent of the environmental pollution problem and some aspects of monitoring pollutants are discussed. There are two broad aspects to the environmental problem; the immediate need to repair the worst of the damage already done and the long-term need to achieve a rational equilibrium. Scientific monitoring, with reliable, repeatable numbers, is a necessary first step to any effective environmental management. Environmental monitoring systems have already been established, but the efficacy of any monitoring system will depend on the basic question of what constitutes environmental quality, which is still an unresolved question. Standards were established for five major air pollutants: sulfur oxides, particulates, carbon monoxide, hydrocarbons, and nitrogen oxides. Instrumentation for monitoring these pollutants has also been determined. A more integrated approach to standard setting, toward a merging of pollution monitoring and control by category of pollutant, as with radiation and pesticides, into the overall, continuous monitoring and control of the whole environment must be the goal.

20475 APTIC NO. 39682

Gucker, Frank T., Jr.

INSTRUMENTAL METHODS OF MEASURING MASS CONCENTRATION AND PARTICULATE CONCENTRATION IN AEROSOLS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 617-633. 36 refs. (May 3-5, Louis C. McCabe, ed.)*

The measurement and control of mass concentration and the determination of particulate concentration is discussed. One of the first methods is a photoelectric device for determining aerosol concentrations. A more convenient and sensitive method of measuring very low aerosol concentrations is to determine the scattering rather than the absorption of the light. The photoelectric smoke penetrometer is described. The instrument has the advantage of a simple optical and electrical system with the disadvantages of high resistances in the DC circuit which require special precautions and of measurements affected by any change in light intensity between calibration with the test aerosol and measurement with the filtered aerosol. A differential photometer is also described. It has increased sensitivity and stability. The photoelectronic particle counter and the electrostatic particle counter are discussed. The photoelectronic counter is suitable for the size-distribution determinations over a wide range of size, but several different wavelengths may have to be used to measure all the sizes conveniently.

20476 APTIC NO. 38716

Halstead, C. J., G. H. Nation, and L. Turner

THE DETERMINATION OF NITRIC OXIDE AND NITROGEN DIOXIDE IN FLUE GASES. PART I. SAMPLING AND COLORIMETRIC DETERMINATION. *Analyst (London), 97(1152):55-63, Jan. 1972. 29 refs.*

Sampling procedure and analytical methods for the determination of nitric oxide and nitrogen dioxide in flue gases are examined with respect to apparatus, reagents, calibration, calculation, accuracy, and repeatability. The Saltzman colorimetric method was used for the determination of NO2 from natural combustion systems; the calibration value of 0.72 was substantiated. Nitric oxide can be determined by the Saltzman method if it is oxidized to NO2 with a sodium dichromate-sulfuric acid oxidation system. The accuracy for both determinations was within approximately + or 5% of the concentration. Flue gas streams must be sampled rapidly through silica or silica-lined probes to prevent oxidation or reduction reactions. (Author conclusions modified)

20477 APTIC NO. 38905

Haneda, Mikiko and Tsunoda, Fumio

MEASUREMENTS OF AIR POLLUTION BY FLUORIDE BY MEANS OF THE LIME TREATED FILTER PAPER METHOD. *(Lime treated filter paper ho ni yoru fukkabutsu no ta taikiosen sokuteiho). Text in Japanese. Kankyo Hoken Report. (Environ. Health Rept.), no. 8:23-30, Jan. 1971. 22 refs.*

Measurements were carried out for fluoride within a radius of 5 km from the aluminium factory, which was considered as a source of pollution, using the Lime Treated Filter Paper method reported by Miller, and Adams, and also the followup measurements were taken to prove the usefulness of this method. Paper filter No. 51A was used in the LTP method. The filters were treated with 1% lime suspension and when they were dried, exposure was made. Two or three LTP were placed in the air screen at six spots which were located in the different distances and directions from the source of pollution. The variation coefficient of the values obtained from within the premises of the factory was 22.3%. The variation coefficients of values in the polluted area outside of the factory were 3.8 8.9% and the average of them of 8.7%. As for the relationship between the exposure duration of LTP and the accumulated amount of fluorine, decreased amounts were observed on the eighth week. Any correlation was not seen between the values obtained by the LTP method and the fluorine amount in soluble components by the dust fall method.

20478 APTIC NO. 39383

Hasegawa, Toshio and Kazuhiro Kuwata

DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN (AIRBORNE) PARTICULATE. *(Funjin chu no takanhokozoku tankasuiso no sokutei ho ni tsuite). Text in Japanese. Kagaku No Ryoiki (J. Japan. Chem.), 25(10):905-920, Oct. 1971. 81 refs.*

A general review on the methods of determination of polynuclear aromatic hydrocarbons in particulates is presented. Sampling, extraction, separation, identification, and quantitative determination are discussed. A high volume sampler is usually used for continuous sampling of 1000-14,000 cu m of air for 24 hr. Solvent extraction-liquid phase partition and vacuum sublimation methods are commonly used in extractions of the samples. Vacuum sublimation is carried out at .01 mm Hg and 300 C for 30 min, and sublimates are taken to 20-100 ml of benzene for thin layer chromatography or to 0.5 to 1 ml of benzene for gas chromatography. A combination of column chromatography and paper chromatography is needed for a sample which contains many kinds of polynuclear aromatic compounds. However, thin layer chromatography has been applied more, since it requires less sample and gives a better separation. Rf values of the major hydrocarbons on various kinds of absorbents are reproduced. The absorption and fluorescence characteristics are also listed. Recently, high resolution mass spectra were used in the determination of hydrocarbons in the atmosphere. The resolution powers of the mass spectrometers are usually more than 10,000. Examples are given for the determinations of the major aromatic hydrocarbons in particulates.

20479 APTIC NO. 38715

Hashimoto, Hoichi and Kikuo Oikawa

THE GASEOUS BODIES -- AIRBORNE PARTICULATE MATTER. *(Kitai - taikichu fuyu biryujo fuyu busshitsu). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 21(3):403-412, March 1972. 8 refs.*

Instructions are given for analyzing airborne particulate matter. The selection of samplers can be made from hi-vol, low- vol, and electrostatic dust samplers. Sieves can include the Whatman, fiberglass, and Japanese Toyo sieves, membrane filters, and metal filters. The flow measurement and particle counting during sampling are discussed. The pre-analysis procedure includes the disposal of organic matter by an electric furnace, the low ash method, and the solvent separation process. The sampling and chemical analysis procedures for the nitric acid and hydrogen peroxide method are given.

20480 APTIC NO. 39762

Haut, Hans van

DETECTION OF SOME AIR POLLUTANTS BY MEANS OF KALE (BRASSICA OLERACEA ACEPHALA) AS INDICATOR PLANT. *(Nachweis mehrerer Luftverunreinigungskomponenten mit Hilfe von Blaetterkohl (Brassica oleracea acephala) als Indikatorpflanze). Text in German. Staub, Reinhaltung Luft, 32(3):109-111, March 1972. 18 refs.*

Air pollutants such as fluorine, chloride, sulfur, and lead were determined by means of the kale (Brassica oleracea acephala) used as plant indicator in nine localities in the Ruhr area. The plants, exposed over a succession of years in the periods from early August until mid-November, showed no visible symptoms of damage. Leaf tissue samples were analyzed for all pollutants. The leaf fluorine content, determined by an electrometric method, was slightly to considerably elevated with 12-10 mg/100 g of dry substance, compared with a natural content of 3 mg/100 g. Chloride content, determined by the potentiometric titration method, was up to four times higher than normal. The sulfur determination, carried out according to Stratmann s microanalytic method, revealed a maximum of 1.83% of S, compared with the normal value of 0.97-1.33%. This may be the result of persistent, fairly low sulfur dioxide concentrations. The lead concentrations, determined by an inverse-polarographic method, were highly elevated in all but two cases. A value of 116 ppm in a plant near a highway was measured. Besides the above pollutants, many aromatic hydrocarbons such as benzo(a)pyrene can be identified by means of kale.

20481 APTIC NO. 39069

Hayakawa, Kiyoko

MICRODETERMINATION AND DYNAMIC ASPECTS OF IN VIVO ALKYL LEAD COMPOUNDS. PART 1. ANALYTICAL METHODS. *Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 26(4):377-385, Oct. 1971. 14 refs.*

A method for the microdetermination of alkyl lead compounds especially for biological samples was studied using a simple process of direct gas chromatography. A glass column and an electron capture detector (ECD) were used. Analytical conditions of gas chromatography such as temperature, length of column, flow rate of the carrier gas, and column packing material were investigated as the basis of retention time, separating state, peak shape (sharpness of response peak), and peak height (sensitivity). As for the analysis of biological samples, a method for removing admixtures from the samples was studied before extraction to avoid the confusion of peaks similar to those of alkyl lead compounds. Extractions were done with reference to the Bolanoswska Method. As a result, 7% Apiezol-L for tetramethyl lead (4EL), 1.5% SE-30 for tetraethyl lead (4EL), and 1 4-BDS for trimethyl and triethyl lead chloride (3ML and 3EL) were applicable for column packing. The flow rate of nitrogen as a carrier gas was 35 ml/min for 4ML and 4EL and 110 ml/min for 3ML and 3EL.

Detection limits were 1 times 10 to the minus 9th power g for 4ML and 1 times 10 to the minus 11th power g for 4EL, 3ML, and 3EL, respectively. Extraction from biological samples were made using organic solvents after the sample had been acidified using hydrochloric acid. Tetraalkyl lead was extracted three times by benzene and trialkyl lead was extracted three times using ethyl acetate. In the case of 3ML and 3EL which contained various substances, extraction by 1% nitric acid was applied, trialkyl lead was transferred into the water and then re-extraction was made. It was possible to purify the samples by this method.

20482 APTIC NO. 39264

Herling, Robert

BETA GAUGE AND FILTER COLLECTION SYSTEM FOR DETERMINATION OF AUTOMOBILE PARTICULATE EMISSIONS. *Preprint, 28p., 1971. 16 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8, 1971, Paper 71-1032.)*

The design, operation, and preliminary test results of a sensitive beta gauge and filter collection system for the determination of aerosols are examined. The efficiency of the system is nearly 100% for measuring aerosol concentrations as low as 125 micrograms/cu m after a 20-minute collection period. In conjunction with a suitable dilution sampling system, the beta gauge and filter collection system can measure automobile particulate emission rates as low as 0.01 g/mile. (Author abstract modified)

20483 APTIC NO. 38741

Hermann, Peter

MEASUREMENT OF GASEOUS FLUORINE COMPOUNDS IN THE OUTDOOR AIR AND IN INDUSTRIAL WASTE GASES. *(Messung gasfoermiger Fluorverbindungen in der Aussenluft und in Industrieabgasen). Text in German. Tech. Ueberwach. (Duesseldorf), 13(2):42-45, Feb. 1972. 29 refs.*

For the measurement of fluorine emissions, the dual paper tape sampler and the bicarbonate coated tube were developed in the U. S. In West Germany, the sorption method has been developed in which the gaseous fluorine compounds are absorbed on a thin sodium carbonate layer which covers silver balls. These balls are in a quartz tube. For separation of the coarse dust a synthetic cylinder is attached to the inlet. The air is drawn on at a speed of 0.8 to 1.0 cu m/hr. For the analysis, the alizarine-Komplexon-Method or a fluoride sensitive electrode is used after distillation. For the measurement of fluorine emissions various sampling equipment is available, such as the Rheinfelder apparatus, the apparatus of the National Center for Air Pollution Control, and the apparatus of the Rhine-Westphalian Technical Inspection Association. The Rheinfelder sampler can be used at relatively low waste gas temperatures (100 C) and a sampling speed of 0.4 cu m/hr. The sampling pipe is of stainless steel, the dust is collected on a heated paper filter. For gas absorption special scrubbers of plexi-glass are used. For analysis the photometric detection via the lanthane complex of the AC is mostly used in West Germany. A comparison of this method with the method of thorium nitrate titration revealed no significant differences. In the U. S. the circonium-SPADNS method is frequently used. All these methods require the prior separation of interfering components, such as heavy metal ions, oxidizers, and various anions. A separation of solid and gaseous fluorine compounds can be only approximately achieved.

20484 APTIC NO. 39008

Hermann, Peter

MEASUREMENT OF GASEOUS FLUORINE COMPOUNDS IN THE ENVIRONMENT AIR AND IN INDUSTRIAL WASTE GASES. *(Messung gasfoermiger Fluorverbindungen in der Aussenluft und in Industrieabgasen). Text in German. Tech. Ueberwach. (Duesseldorf), 13(2):42-45, Feb. 1972. 29 refs.*

Different techniques for the measurement of fluorine compounds are reviewed. Practical emission measurements are made by means of sorption techniques with preliminary separation of coarse particles. The techniques using a sodium bicarbonate-coated tube and dual paper tape sampler have been improved by the Boyce-Thompson Institute (Yonkers, N. Y.) to facilitate the separation of gaseous and particulate fluorine compounds. The analysis can be made by distillation or fluoride-sensitive electrode. Sampling on NaCO3 coating and analysis by the alizarin technique and fluoride-sensitive electrode were carried out. Quartz probes with quartz filters are useful in sampling for emission measurements. Different types of samplers are described. In fluorine ion determination, both the alizarin and thorium titration methods give reliable results. The SPADNS method is preferred in the U. S. When using a fluoride-sensitive electrode, special attention should be given to the aluminum ion concentration. The standard deviation for concentrations of 15-34 mg F/cu m, from combustion processes, lies in a range of plus or minus 0.6-2.8 mg F/cu m. The results of emission measurements are given.

20485 APTIC NO. 39022

Hildebrandt, P. W.

AIR POLLUTION MONITORING. *Hort Science, 5(4):243-244, Aug. 1970.*

Techniques for monitoring pollutants in the ambient air and monitoring with relation to effects on vegetation and materials are reviewed. Limits of applicability, efficiency, operating principles and problems reviewed for fluoride sampling using filters and impingers; automated sulfur dioxide analyzers based on colorimetric (West and Gaeke), coulometric, and conductivity methods; colorimetric and coulometric techniques the potassium iodide method, and SO2 scrubbers for defining oxidant and ozone concentrations; infrared spectrometry for carbon monoxide analysis; high volume samplers and fiberglass filters for measuring suspended particulates; and particle fallout measurements. In addition to measuring the contaminants, effects monitoring using sulfation candles, rubber cracking, indicator plants, visibility measurements, dye and fabric deterioration, and dust fall is often used.

20486 APTIC NO. 38949

Holzbecher, Zavis and Ladislav Sucha

EVALUATION OF THE RESULTS OF DETERMINATIONS OF IMMISSIONS OF GASEOUS NOXIOUS SUBSTANCES IN THE ATMOSPHERE, OBTAINED BY VARIOUS ANALYTICAL METHODS. *(Hodnoceni vysledku stanoveni imisi plynnych skodlivin v ovzdusi ziskanych ruznymi analytickymi metodami). Text in Czech. Chem. Listy, 66(1):41-49, Jan. 1972. 8 refs.*

Concepts of importance in the measurement of atmospheric pollutants are defined, and analytical procedures and methods for measuring concentrations of noxious agents (especially sulfur dioxide) are characterized. Interval (photometric or titrimetric) and continuous (polaro-coulometric or conductometric) methods are also discussed. The comparison of results obtained by a continuous method with those of an interval method is possible only if identical conditions are maintained during sampling, and only after recalculation of instant concentrations (recorded during the continuous method) to average values corresponding to time intervals in which the interval method gives results. For correlation, the Student t-test or the Lord u-test are suitable.

20487 APTIC NO. 39763

Jaenicke, R.

THE OPTICAL PARTICLE COUNTER: CROSS-SENSITIVITY AND COINCIDENCE. *Aerosol Sci., 30(2):95-111, 1972. 14 refs.*

The use of optical particle counters for measurement of the size distribution of natural aerosols appears straightforward. After calibration with test aerosols of known properties, subsequent measurements are interpreted as normalized size distributions. The problems of coincidence and cross-channel sensitivity are discussed, including how to handle them. Coincidence is the simultaneous occurrence of more than one particle at a time in the sensitive volume, in which case the pulse height analyzer counts a single pulse corresponding to a single larger particle which makes the overall observed count lower than the true one. Cross-sensitivity describes the experimental situation in which all particles of the same size are not counted in the same channel. Measurements are reliable only when the coincidence loss is less than 1%; for most instruments this result dictates that the concentrations be very low. Because the particle concentration in natural aerosols decreases steeply as the size increases, cross-sensitivity may prevent the detection of fine structure in the distribution. Cross-channel sensitivity can be eliminated by employing a method based on the solution of a system of linear equations. Because the matrix which results is ill-conditioned, special methods of evaluation are necessary. The sensitivity of the evaluation process to error was tested by calculations which simulate the operation of the particle counter. (Author abstract modified)

20488 APTIC NO. 39065

Jeltes, R., E. Burghardt, and J. Breman

GAS CHROMATOGRAPHIC DETERMINATION OF PHOSGENE AND DICHLOROACETYLENE IN AIR. *Brit. J. Ind. Med. (London), 28(1):96-99, 1971. 13 refs.*

Chlorinated hydrocarbons, used in large quantities in industries, may decompose under certain conditions and form very toxic compounds, e.g., phosgene and dichloroacetylene, each with a threshold limit value of 0.1 ppm. A gas liquid chromatographic method was developed, therefore, for the determination of sub-threshold values in working areas. Using electron capture detection, the method can simultaneously determine concentrations from 0.02 ppm of phosgene and dichloroacetylene in one sample without interference from substances such as trichloroethylene from which they may be formed. Operating conditions, calibration, and experimental results are examined.

20489 APTIC NO. 39170

Jones, F. Nowell

AN OLFACTOMETER PERMITTING STIMULUS SPECIFICATION IN MOLAR TERMS. *Amer. J. Psychol., 67(1):147-151, March 1954. 4 refs.*

An inexpensive and accurate olfactometer was developed in which the odorous stimuli are contained in a series of evaporation bottles. Each unit consists of two bottles containing identical materials, so that as odorous air is drawn off, dilution progresses slowly, and each bottle has a glass-wool wick to hasten evaporation For each odor a syringe, three-way stopcock, and nosepiece are provided. These are clamped into holders on the main body of the apparatus and connected to the absorption bottles by a short length of silicon-rubber tubing. When clamped into position, the plunger of the syringe makes contact with a rack driven by switch controlled constant-speed motor. A stop and the length of the toothed portion of the rack determine respectively the point at which the movement of the rack begins and the point at which it terminates. Since the stop and the motor-mount are adjustable, the extent of movement, and therefore the amount of air forced from the syringe, may be readily varied. A blast of 40 cc is delivered in 0.8 sec. These magnitudes are such as to minimize quantity of stimulus-blast as a determiner of threshold. The experimental routine for obtaining a single threshold is outlined.

20490 APTIC NO. 39602

Jones, F. Nowell

SCALES OF SUBJECTIVE INTENSITY FOR ODORS OF DIVERSE CHEMICAL NATURE. *Amer. J. Psychol., vol. 71:305-310, 1958. 4 refs.*

The subjective intensities of n-butanol, sec-butanol, isobutanol, ethyl acetate, cyclohexane, and pyridine at several levels of concentration were scaled by the method of magnitude-estimation, using panels of untrained observers. When the stimulus-concentrations are stated as ratios to the absolute threshold for the given odor, the relation between estimated subjective magnitude (ME) and stimulus-intensity (VP/VPo) can be expressed according to the formula ME equals a(VP/VPo) raised to the exponential power b, with small residual variance. There is no evidence for a different stimulus-receptor interaction for polar compared to non-polar substances in the results; thus, previous results indicating that subjective olfactory intensity follow the same general laws as similarly judged intensities in other senses are substantiated. The exponent b for odors is about 0.5 plus or minus 0.1. (Author summary modified)

20491 APTIC NO. 39232

Jonsson, Erland

ODOR SURVEYS. *Preprint, Environmental Protection Agency, Washington, D. C., 8p., 1971. 7 refs. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Most reactions elicited in surveys of public response to odorous air pollutants are annoyance reactions. Variations in reactions are often caused not by variations in exposure but rather by individual attitudes and socioeconomic factors. As a rule, the effects of offensive odors on the exposed population are based only on the exposed individual's experience of conditions, which reduces the possibility of establishing objective data about the reactions of interest. A study of physiologic reactions correlated with annoyance reactions would therefore be very desirable. The results of several Swedish studies indicate that relatively large segments of the population are affected by the odor problem, particularly near sulfate cellulose factories. The results, however, have been of limited value in establishing air quality criteria, since the reactions have not been related to the exposure conditions. (Author summary modified)

20492 APTIC NO. 39719

Keinitz, H.

DEVELOPMENT OF METHODS OF GAS ANALYSIS. *Z. Anal. Chem., vol. 192:160-189, 1963. 29 refs. Translated from German by G. A. MacDonald, British Iron and Steel Industry Translation Service. London (England), 36p., Dec. 1970.*

The basic chemical reactions used for gas analysis are reviewed with respect to method for detection and determination and sample preparation. Analytical methods for hydrogen, fluorine compounds, hydrogen fluoride, chlorine compounds, hydrogen chloride, oxygen, ozone, hydrogen sulfide, sulfur dioxide, sulfur compounds, nitrogen, ammonia, nitrous oxide, nitric oxide, nitrogen dioxide, phosphorus compounds, arsenic compounds, antimony compounds, carbon monoxide, carbon dioxide, hydrogen cyanide, carbonyl sulfide, silicon compounds, zinc compounds, lead compounds, boron compounds, and hydrocarbons, e.g., paraffins, olefins, acetylenes, formaldehyde, ethers, ketones, mercaptans, methanes, nitrites, and amines include colorimetry, volumetric techniques, iodimetric methods, spectrophotometry, coulmetry, polarographic methods, electrochemical methods, mass and ultraviolet spectrometry, flame ionization detectors, and turbidimetry.

20493 APTIC NO. 38968

Kildal, Helge and Robert L. Byer

COMPARISON OF LASER METHODS FOR THE REMOTE DETECTION OF ATMOSPHERIC POLLUTANTS. *Proc. IEEE (Inst. Elec. Electron. Engrs.), 59(12):1644-1663, Dec. 1971. 61 refs.*

Three optical methods for remote air pollutant detection and monitoring are compared and discussed: Raman backscattering, resonance backscattering, and resonance absorption. The application of these methods is now possible due to the invention of the laser and to the recent development of tunable coherent light with the dye laser and parametric oscillator. Theoretical expressions are derived for the minimum concentrations of carbon monoxide, sodium, mercury, benzene, nitrogen dioxide, and sulfur dioxide detectable by the methods. In each case depth resolution and problems of interference, pump depletion, and background noise are discussed. Brief descriptions of present laser capabilities are included together with numerical examples of the detectabilities based on present technology. Atmospheric transparency limits the useful range of the Raman and resonance backscattering schemes to a few kilometers. For the resonance absorption technique the useful range can be as great as 50 km. (Author abstract modified)

20494 APTIC NO. 39495

King, Graham H.

DETECTION AND QUANTITATION OF POLUTANTS. *Ind. Process Heat., 1970:28-29, Nov. 1970.*

Instrumentation for the quick and accurate measurement of air and water pollutants is reviewed. The continuous monitoring of water quality is within two main classifications: chemical and physical. Apparatus for determining the chemical parameters and operating procedures of the measurement methods are examined. Analytical methods for the determination of sulfur dioxide in the air, with respect to the applicability of continuous monitoring, potentiometry, and the West and Gaeke techniques, are reviewed. Colorimetry, infrared spectrometry, and other physical and chemical means are also considered for the measurement of nitrogen dioxide, nitric oxide, total oxidants, aldehydes, hydrogen sulfide, carbon dioxide, and carbon monoxide. In general, equipment used for continuous analysis should be capable of detecting at least 75% of the discharge concentration of not more than 3 min duration.

20495 APTIC NO. 38873

Kish, P. P. and G. M. Vitenko

EXTRACTION AND DETERMINATION OF MERCURY BY MEANS OF PHOTOMETRY USING 6-METHOXY-3-METHYLBENZTHIAZOLE-AZO-4N-METHYLDIPHENYLAMINE. *(Ekstraktsionno-fotometricheskoe opredelenic rtuti s 6-metoksi-3-mitilbenztiazol-azo-4N-metildifenilaminom). Text in Russian. Zavodsk. Lab. (Moscow), 38(1):5-8, 1972. 11 refs.*

The method described is based on a reaction of mercury bromide ion with 6-methoxy-3-methylbenzthiazole-azo-4N-methyldiphenylamine (MMAM) in an acid medium. The blue complex formed is extracted by means of toluene and cyclohexane in a ratio of 1:3. Acids such as sulfuric acid, phosphoric acid, hydrochloric acid, and acetic acid can be used for the determination. Single-stage extraction yields an efficiency of 99% under optimum conditions. The absorption meximum was found at 642 nm, and the molar extinction coefficient was 75,000. Maximum and stable optical density occurred within a range of 0.00033-0.05 g bromide ions/1. The extraction equilibrium was reached after about 30 sec. Behr s law was valid in a range of 0.1-8 micrograms Hg/ml. The phase ratio dependence of the Hg distribution coefficient was investigated in different acids. The total analysis required 20-30 min, of which the extraction took 1 min. The sensitivity was 0.000001% in sulfuric and phosphoric acids, and 0.00001% in acetic and hydrochloric acids. Procedures for the determination of mercury impurities in potassium hydroxide and acids are described.

20496 APTIC NO. 38973

Kneip, T. J., R. S. Ajemian, J. R. Carlberg, J. Driscoll, H. Freiser, L. Kornreich, K. Kumler, and R. J. Thompson

TENTATIVE METHOD OF ANALYSIS FOR INORGANIC LEAD CONTENT OF THE ATMOSPHERE. *Health Lab. Sci., 9(1):79-83, Jan. 1972. 8 refs.*

Lead ion reacts quantitatively with diphenylthiocarbazone (dithizone) in the absence of chelating agents in the 8.5-11.5 pH range to form red lead dithizonate which is extractable with organic solvents, e.g., chloroform. The red color, which is proportional to the amount of lead present, can be measured spectrophotometrically at 510 nm. Range and sensitivity, interferences, precision and accuracy, apparatus, reagents, procedure, standards and calibrations, calculations, and the effects of storage are given.

20497 APTIC NO. 38986

Kothny, E. L., W. A. Cook, B. Dimitriades, E. F. Ferrand, C. A. Johnson, L. Levin, P. W. McDaniel, and B. E. Saltzman

TENTATIVE METHOD FOR THE CONTINUOUS ANALYSIS OF ATMOSPHERIC OXIDANTS (COLORIMETRIC). *Health Lab. Sci., 9(1):62-70, Jan. 1972. 25 refs.*

Air samples are scrubbed in a wetted wall absorber with a reagent solution, and the resulting color is measured photometrically and recorded continuously on a strip chart recorder to determine oxidants. Oxidants are defined as those substances, with the exception of nitrogen dioxide, which liberate iodine from a neutral buffered potassium iodide solution. In the atmosphere, the larger part of the oxidants is made up of ozone. Smaller amounts are contributed by the peroxyacyl nitrates and other oxidizing substances. Range and sensitivity, interferences, precision and accuracy, apparatus, reagents, procedure, calibration and standardization, calculations, and the effect of storage are given.

20498 APTIC NO. 38991

Kothny, E. L., W. A. Cook, B. Dimitriades, E. F. Ferrand, C. A. Johnson, L. Levin, P. W. McDaniel, and B. E. Saltzman

TENTATIVE METHOD OF ANALYSIS FOR NITRIC OXIDE CONTENT OF THE ATMOSPHERE. *Health Lab. Sci., 9(1):71-74, Jan. 1972. 12 refs.*

After chemically removing nitrogen dioxide normally present in the atmosphere, the nitric oxide in a sample can be converted to an equimolar amount of NO2 by oxidation. A total conversion in the gas phase can be obtained with chromic oxide supported on inert inorganic materials. The NO2 so generated then can be determined by absorption in Griess-Saltzman reagent to produce a pink color. Range and sensitivity interferences, precision and accuracy, apparatus, reagents, procedure, calibration and standardization, calculations, and the effects of storage are given.

20499 APTIC NO. 38776

Kushnir, Yu. M. and Ye. F. Shkatov

DETERMINATION OF SULFUR DIOXIDE CONCENTRATION IN WASTE FLUE GAS FROM THE PRODUCTION OF ELEMENTAL SULFUR. *(Opredeleniye kontsentratsii SO2 v otkhodyashchem dymovom gaze protsessa polucheniya elementarnoy sery). Text in Russian. Neftepererab. Neftekhim., no.11:13-14, 1970. 2 refs.*

The determination of sulfur dioxide in gas flow by means of polarography is described. Current passed through an acidified water solution of copper sulfate was measured. The amount of SO2 contained in the sample was determined from the voltage drops under constant resistance of the electric current conditions. A description of the detector unit is included and the need for a continuous fresh flow of the Cu SO4 solution to maintain the stability of the copper electrode ionization potential is emphasized.

20500 APTIC NO. 39396

Lahne, H., M. Kliemt, and G. Franke

A CONTINUOUS PROCESS FOR THE SEPARATION OF RESPIRABLE DUST IN AEROSOLS. *(Verfahren zur kontinuierlichen Abscheidung lungengaengiger Staubteilchen aus Aerosolen). Text in German. Maschinenbau, 20(5):219-221, 1971. 1 ref.*

A new portable device for the continuous sampling of respirable dust from aerosols is described. The sampler is suitable for continuous or semi-continuous operation over 1-2 wk and 4-8 wk, respectively. In the latter case, definite air volumes are sampled once every hour. A constant air flow is maintained by an electromagnetic membrane pump, while the flow rate through the filter can be varied between 0 and 90 l/hr. Selective separation is provided by simple flow rate variation in a range of 0-1.3 cm/sec, corresponding to a particle size range 0-12 micron. A flow rate of 0.5 cm/sec is applied, according to Stokes law, for the selective separation of respirable dust particles of 5-8 micron. The variations in the air flow are + or 5%. Besides the possibility of continuous and representative sampling, the device has the advantages of being relatively cheap and requiring minimum maintenance. The samples obtained are highly suitable for correct gravimetric analysis. Several units have been used satisfactorily for years.

20501 APTIC NO. 38736

Lee, T.

MEASUREMENT OF THE ACID DEW POINT OF SULFURIC ACID CONTAINING GASES. *(Beitrag zur Messung des Saeuretaupunktes von schwefelsaeurehaltigen Gasen). Text in German. Mitt. Ver. Grosskesselbetr., 52(1):44-48, Feb. 1972. 14 refs.*

Direct and indirect methods for the measurement of the acid dew point temperature in sulfuric acid containing flue gases were examined. By means of an experimental set-up, a flue gas of any desired composition could be mixed. The acid dew point was determined by application of partial condensation dependent on the sulfuric acid concentration. For the measurement of small sulfuric acid concentrations, the Thornton method was used. Dew points down to 98 C (0.068 ppm) could be determined with reproducible results. The measured dew points as a function of the sulfuric acid concentration are shown in a graph with water vapor as parameter. Any change of the water vapor concentration has a larger influence on the dew point at higher acid concentrations. A smaller water vapor concentration has a larger influence on the dew point than a higher water vapor content. A comparison of these results with calculated or measured results provided by the literature reveals a satisfactory agreement. With the impulse method, dew point measurements were taken of gas flows with 10% by volume water vapor and sulfuric acid concentrations of 80, 40, 20, 8, 4, 2, 0.8, and 0.4 ppm. The temperature of the test gas was 230 C. In this method a certain electric voltage is applied in regular intervals to the electrodes of the measurement set-up. A pulsed current is produced whose amperage is measured in dependence of the surface temperature. Ring electrodes were used for the measurements. Reproducible impulse currents were obtained which permitted the determination of a threshold amperage (20 micro-ampere). At concentrations between 4 and 40 ppm and a threshold amperage of 20 micro-ampere the dew point equals the surface temperature with an accuracy of + or 2 deg.

20502 APTIC NO. 39202

Lindvall, Thomas

SENSORY EVALUATION OF ODORS IN THE AMBIENT AIR. *Preprint, Environmental Protection Agency, Washington, D. C., 15p., 1971. 25 refs. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Sensory methodology for the evaluation of odors in ambient air is examined with regard to equipment and dimensions of analysis. Sensory methodology can be used as a tool in description of dosage as well response. Olfactometers should be developed which permit known and stable exposure concentrations, rapid changes in concentration, and fairly natural respiratory conditions. Odor hoods, test chambers, and laboratory conditions are reviewed. A given odor sensation may be generally described in four dimensions, i.e., in terms of detectability intensity, acceptability, or quality. Advantages and limitations of detection methodology are discussed for the observation method, the method of signal detectability, retrospective opinions, and the prognosis-type method.

20503 APTIC NO. 39168

Lorenz, G.

DETERMINATION OF AEROSOLS BY MEANS OF SCINTILLATOR SPECTRAL ANALYSIS. *(Aerosolbestimmung nach dem Verfahren der Szintillations-Spektalanalyse). Text in German. Dechema Monograph., 67(1222-1263):255-264, 1971.*

The Sartorius scintillation spectrum particle counter for quantitative and, under certain conditions, qualitative aerosol analysis is examined. The aerosol particles are heated to excitation temperature in a special chamber; they then emit a flash of light, the intensity and spectral composition of which are characteristic of the diameter and chemical composition of the particle. The theoretical basis and experimental confirmation of the instrument are discussed. Calibration curves for sodium, lithuim, calcium, strontium, lead, and uranium particles are determined. The measurement results obtained with the counter include a digital readout of mass concentration in mg/cu m and particle concentration in particles/cu cm; and the number of particles as cumulative frequency values in ten different size intervals. 0

20504 APTIC NO. 39789

Lundgren, D. A.

MASS DISTRIBUTION DATA FROM THE 1969 PASADENA SMOG EXPERIMENT. *J. Colloid Interface Sci., 39(1):205-210, April 1972. 5 refs.*

Approximately 50 particulate mass distribution samples were collected using Lundgren Impactors. Total particulate was also determined using filters; these were run during each impactor run in order to obtain an overall mass balance. The particulate mass concentration data from this study indicate an average of about 100 micrograms/cu m and a 95% range from about 50-200 micrograms/cu m. The impactor particle size distribution data indicate an average particle mass mean diameter of about 0.6 micron and a particle size distribution that is somewhat log normal with an average geometric standard deviation of about 3.5. The Minnesota Aerosol Analysis System (M.A.A.S.) indicated that a much larger fraction of the mass was associated with the several micron and larger size particles. A ratio of impactor-determined particulate mass to the M.A.A.S.-determined particulate volume fraction gave an average ratio of about 1.7. The main function of the impactor was to obtain time and size-fractioned particulate samples for the chemical analysis to be run by others.

20505 APTIC NO. 38755

Malin, H. M.

PROJECT THRESHOLD: TESTING THE TESTS. *Environ. Sci. Technol., 6(1):23-24, Jan. 1972.*

Project Threshold was launched early in 1971 by the American Society for Testing Materials to look at some 35 different methods for measuring various atmospheric pollutants, in order to test their accuracy and precision. Phase I is designed to evaluate seven test methods for measuring sulfur dioxide, nitrogen dioxide, lead, sulfation rate, and dust fall. These include the Griess-Saltzman reaction, the lead peroxide candle, the West-Gaeke method, and the optical density of the filtered deposit. Phases II and III will focus on methods for some hydrocarbons, nitric oxide, hydrogen sulfide, mercaptans, and certain particulate matter. After the project committee has decided on the best procedure for a given test, several cooperating independent laboratories will make separate analyses of a split sample, following the committee s written procedure letter by letter. By comparing results among laboratories, ASTM can determine statistically valid accuracy and precision parameters which give some frame of reference for subsequent test results. The sampling sites for Phase I are indicated, as well as the experimental procedures.

20506 APTIC NO. 38795

Mammarella, L.

AEROSOL SAMPLING BY MEANS OF A ROTARY SYSTEM MOBILE IMPACTOR. *(Il campionamento di aerosoli mediante un sistema rotante a collisore mobile a filo sottile). Text in Italian. Nuovi Ann. Igiene Microbiol. (Rome), 22(1):49-62, Jan./Feb. 1971. 15 refs.*

The design characteristics and efficiency of a rotating aerosol sampler with a mobile impactor are examined. The system consists of a rotating apparatus (at 1000 or greater rpm) run by a continuous power source; a light frame fitted over the rotor holds a series of thin vertical wires. The tangential speed of the wires varies by varying the axial distance of the wires from the rotation axis. With a motor rotation of 1000 rpm, a wire 18 mm from the axis rotates at 1.8 m/sec, while a wire 11 mm from the axis rotates at 1.2 m/sec. In a series of sampling tests, the wires were coated with a light film of silicon grease; collection efficiency was good, ranging within particle sizes 1-10 micron. After sampling, the wires may be examined by microscope in transparency or by reflection. The system is inexpensive, simple, adaptable to increased efficiencies, and continuous for periods of over 24 or 48 hr.

20507 APTIC NO. 38866

Matsushita, Shukaku

ODOR SENSITIVITY TEST (1). *(Kyukaku kanno shiken). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 1(5):9-19, Aug. 1971. 14 refs.*

Results of odor sensitivity tests conducted by various methods and instruments are described. The odor sensitivity of cigarette smokers is lower than that of non-smokers in the test of odors, similar to cigarette smoke odor, but it is almost the same as that of the non-smoker in the testing of other odors. The odor sensitivity duration tests prove that man tends to lose his sensitivity when tested repeatedly with the same kind of odor, but does not lose it when tested with different alternating odors. The Phenol Test given to workers at battery manufacturing factories showed that many workers had an odor insensitivity problem caused by the high count of cadmium dust floating in the factory area. The test taken by Joyner shows that a relatively high degree of coherency exists between persons who claim to possess keen sensitivity to odor and results of actual sensitivity tests on them, and that there is a general tendency of odor sensitivity declining as a person grows older. Future studies are needed in the area of widening the selection of odor materials used for odor sensitivity testing.

20508 APTIC NO. 38773

Matteson, Michael J. and Edward Y. H. Keng

AEROSOL SIZE DETERMINATION IN THE SUBMICRON RANGE BY THERMOPHORESIS. *Aerosol Sci., vol. 3:45-53, Feb. 1972. 13 refs.*

A device is proposed whereby particles in the submicron range may be distributed by size in situ by a thermal force mechanism. An aerosol is passed upward through two porous metal plates separated by a space of 1 to 5 cm. The upper plate is heated and the lower one cooled, such that a temperautre gradient exists between plates. Particles moving through the cooler plate at essentially the same velocity as the carrier gas will come to a halt in the space between the plates when the thermal and drag forces on the particles are in equilibrium. This equilibrium stopping distance depends on particle size, the larger particles stopping closer to the upper plate. Continued passage of the aerosol-laden stream leaves increasing numbers of particles stratified in order of increasing size. When sufficient concentration is achieved, optical techniques can be employed to determine the particle size distribution. (Author abstract modified)

20509 APTIC NO. 39419

Matthews, B. J. and R. F. Kemp

DEVELOPMENT OF LASER INSTRUMENTATION FOR PARTICLE MEASUREMENT. (FINAL REPORT). *TRW Systems Group, Redondo Beach, Calif., Environmental Protection Agency Contract CPA-70-4, TRW Rept. 14103-6003-R0-00, 64p., June 1971. 7 refs.*

NTIS: PB 205189

The use of laser-illuminated instrumentation for measuring particulate density distributions in an operating coal-fired steam boiler was investigated. To study the feasibility of making holograms of side or back scattering of a ruby laser beam, a mathematical model was derived which gives the transmittance along the scattering path from the laser to a detector, and allows analysis of experimental measurement. Laboratory tests showed less than a factor of two difference in the scattering efficiency between fly ash and fly ash/limestone mixtures. Instensity of the scattering was predominantly in the low angle forward direction with a smaller lobe in the back scatter direction; side scattering was the least intense. Based on all past and present studies, the forward scattering method is by far the optimum means for visualizing particle distributions and acquiring particle density data. Straight path transmission measurements at elevation 392 of a 140-megawatt boiler indicated particle densities between 4000 and 4600 fly ash particles/cu in. without limestone injection; comparative tests at elevation 376 showed an increase in scattered light intensity of 1.3-2.4 during limestone dust injection. Direct solution of the particle scattering model proved impractical, but an alternate method did not demonstrate a sensitivity to increases in particle density from the presence of limestone dust. Calculations from the elevation 376 measurements indicate that pulsed ruby laser holography of particle back scatter may be feasible. Analysis of the same data for particle flow field dynamic characteristics suggests that limestone distribution at this elevation is not spatially or temporally uniform.

20510 APTIC NO. 39617

Matthews, B. J. and R. F. Kemp

HOLOGRAPHY OF SCATTERED LIGHT BY PARTICULATE IN A LARGE STEAM BOILER. *Preprint, American Inst. of Chemical Engineers, New York, 17p., 1970. 8 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 63rd, Chicago, Ill., Nov. 29-Dec. 3, 1970.)*

Particle distributions in a 140-megawatt, pulverized coal-burning steam boiler were sensed by holographically recording low angle, forward scattered light from a pulsed ruby laser, as part of a full-scale evaluation of the dry limestone process of removing sulfur oxide from power plant stack gases. Holograms were recorded in the presence of limestone plumes injected into the boiler and recorded normal operation with only fly ash distributions. The two-beam holographic apparatus used for these tests is described and the results are summarized. The feasibility of applying holographic techniques to the study of limestone particulate clouds was demonstrated. In addition to obtaining qualitative information, photometric means of evaluating the holographic scattered light images were developed. As a result, spatial resolution of limestone plume detail (e.g., overall cloud dimensions, existence of structure and discrete voids) is possible. The spatial measurements obtained via densitometry data reduction methods were confirmed optically using a calibrated ranging telescope with which the edges of plume scattered light images in the reconstructed hologram could be brought into focus and a corresponding distance measurement noted on the calibrated focusing tube of the telescope. This work will add to the application of holographic techniques for particulate monitoring.

20511 APTIC NO. 39370

McDowell, Robin S.

METAL CARBONYL VAPORS: RAPID QUANTITATIVE ANALYSIS BY INFRARED SPECTROPHOTOMETRY. *Am. Ind. Hyg. Assoc. J., 32(9):621-624, Sept. 1971. 6 refs.*

Infrared spectrophotometry using multiple-reflection long-path cells was investigated as a method for the quantitative analysis of nickel carbonyl and iron pentacarbonyl vapors. Experimental procedures and results are discussed. By using the very strong carbonyl stretching frequencies near 2000/cm, detectability limits on the order of 0.01-0.001 ppm can be attained. The method is rapid, specific, and free from interference; accuracy was estimated at + or 10%. (Author abstract modified)

20512 APTIC NO. 39732

McLellan, Alden, IV

ATMOSPHERIC POLLUTION DETECTION BY SATELLITE REMOTE SENSING. *Michigan Univ., Ann Arbor, Center for Remote Sensing Information and Analysis and Environmental Protection Agnecy, Washington, D. C., Water Quality Office, Proc. Symp. Remote Sensing Environ., 7th, Ann Arbor, Mich., 1971, vol. 1:563-584. (May 17-21.*

A feasibility study was made to investigate the possibility of monitoring the variation in turbidity over a city-wide area by means of passive remote sensing from a satellite in earth synchronous orbit. It was shown that the relative change in sun-reflected radiation over Los Angeles, Calif. on April 23, 1968 as measured by the green channel data from the geostationary application technology satellite III located 35,000 km from the earth can be correlated with ground-based data, such as local horizontal visibilities and reflectometer measurements of sampled particulate matter. The pilot program opens up the possibility that the appropriate sensing detectors on board geosynchronous satellites, monitoring of the time and spatial profiles of atmospheric molecular pollutants as well as particulate matter can be achieved over cloud free areas. (Author abstract modified)

20513 APTIC NO. 38955

Megaw, W. J. and A. C. Wells

THE SIZE OF AIRBORNE DOW POLYSTYRENE SPHERES. *Aerosol Sci., vol. 3:1-6, Feb. 1972. 8 refs.*

Dow polystyrene spheres are closely uniform in size, relatively easy to disperse as an aerosol, and can be used to provide closely monodisperse aerosols of spherical particles which are ideal for the experimental testing and calibration of instruments. Measurements of the electrical mobility of these spheres in the range 0.05-1.0 micron radius have established that for particles below 0.1 micron radius the experimentally determined mobility is considerably less than that calculated from the theory of Fuchs and Stechkina. Experiments at low pressure with larger spheres are described which confirm that the theory is valid for the relevant range of lambda/r, and it is considered that a layer of stabilizer is present which substantially increases the radius of the 0.05-micron radius spheres. This layer is not visible in the electron microscope and attempts to remove it have been unsuccessful. The effective airborne radius of 0.05-micron radius spheres is concluded to be 0.058 micron. (Author abstract modified)

20514 APTIC NO. 39780

Morrow, N. L., R. S. Brief, and R. R. Bertrand

AIR SAMPLING AND ANALYSIS. *Chem. Eng. Deskbook, 79(10):125-132, May 8, 1972. 14 refs.*

Stack gas sampling and analysis with respect to selection of sampling site, sampling methodology, gas flow measurements, gas and particulate sampling, and sampling train construction and operation are reviewed. For measurements of fixed gas concentration, i.e., determinations of nitrogen, carbon dioxide, and oxygen, Orsat analysis, gas chromatography, and electrometric and nondispersive infrared analyzers (NDIR) may be used. The efficiency, operating principles, applicability, and advantages are examined for iodimetric methods, gas chromatography, flame ionization detectors, and continuous monitoring by NDIR analyzers for carbon monoxide; wet chemical methods, spectrometry, electrochemical sensors, paper tape monitors, chromatography, flame photometry, and colorimetry for sulfur compounds, including sulfur dioxide, sulfur trioxide, hydrogen sulfide, and mercaptans; colorimetry, photometric analysis, spectroscopy, electrochemical methods, and chemiluminescent detectors for nitrogen oxides; opacity measurements using the Ringelmann chart and transmissometers and mass measurements via filters. spectrophotmetry, microscopy, piezoelectric monitoring, and beta attenuation monitors for particulates; and flame ionization detectors, spectroscopic methods, and gas chromatography for hydrocarbons.

20515 APTIC NO. 39171

Moser, Robin E.

DETERMINATION OF LEAD IN ATMOSPHERE AND URINE. *Ind. Health Mon., 11(6):94, June 1951.*

With regard to a previously published article on the determination of atmospheric lead by the polarographic method, in which nitric and hydrochloric acids are added to the sample suspensions, and then evaporated to dryness, it is recommended to ignite the dried suspensions and deposits of gummy material at 500-600 C for a few minutes for better results. With regard to another article describing a rapid screening test for urinary lead, it is reminded that the ammonia solution of dithizone is quite unstable, and must be added to the solution containing the citrate, sulfite, and cyanide as soon as possible.

20516 APTIC NO. 38935

Musashino, Hideo

ON MEASUREMENT OF AIRBORNE DUST. *(Taiki chu no funjin sokutei ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(4):9-18, April 1972.*

This is a general discussion of devices available for measurement of airborne dust. Deposit gauges, dust jars, petri dishes, aluminum foil, and gum tape methods were briefly introduced for measurement of settling dust. Suspended dusts and aerosols are classified into dust, fumes, mists, fog, smoke, and ashes according to physical and chemical characteristics. Measuring apparatus for suspended dust, their basic mechanism, advantages, and disadvantages were discussed. The apparatus include High-volume air samplers, Low-volume air samplers, paper filter dust meters, tape air samplers, electrostatic air samplers, Roken-type dust meters, Funken-type Conimeter, cascade impactors, thermal precipitators, impingers, floating dust scopes, digital dust meters, and particle monitors.

20517 APTIC NO. 39283

Nader, John S.

CURRENT TECHNIQUES OF ODOR MEASUREMENT. *A.M.A. Arch. Ind. Health, 17(5):537-541, May 1958. 12 refs.*

Proper evaluation of odor on the basis of its definition requires both a measurement of odorant concentration and a measurement of human response. Instruments are devised to provide known and controlled concentrations of odorants. Human sense of smell is necessary to detect the perceptual characteristics of odor, which are defined in terms of their perception. Representative types of odor apparatus now in use vary from the simple syringe technique for threshold dilution ratio measuremtns to precise and versatile odor evaluation apparatus for field and laboratory use. Data resulting from odor measurements are randomly distributed for a population of subjects and require statistical evaluation. (Author summary modified)

20518 APTIC NO. 36916

Nagai, Takeshi, Tomo Hattori, Takao Nagano, and Yoshifumi Ukijima

STUDY OF THE INFLUENCE OF HYDROGEN SULFIDE (I). A SIMPLE METHOD FOR THE HYDROGEN SULFIDE PAPER BADGE. *(Ryuka suiso no eikyo ni kansuru kenkyu daiippo, kenchi bacchi ni yoru ryuka suiso no kani sokutei. Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6 (1):77, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

A simpler and less expensive, although less accurate, method than conventional ones to determine hydrogen sulfide was developed. Filter papers were immersed in solutions of different concentrations of silver nitrate, lead nitrate, and lead acetate and solutions alkalized with ammonium carbonate and dried in air When these papers were exposed to hydrogen sulfide of 4.25 ppm for one hour, papers immersed in 5% lead acetate solution (without alkalization) gave best result. In addition, this lead acetate paper gave a distinct change in color with hydrogen sulfide concentration changes, had good reproducibility of color, and were not disrupted by methyl mercaptan, sulfur dioxide, and direct sunlight.

20519 APTIC NO. 39250

Nash, T.

ABSORPTION OF NITROGEN DIOXIDE BY AQUEOUS SOLUTIONS. *J. Chem. Soc. A, no. 18:3023-3024, 1970. 6 refs.*

Nitrogen dioxide at low concentrations in air is very poorly absorbed by water in simple bubblers, unless certain reactive solutes are present. Attention was therefore concentrated on possible electron-donor charge-transfer reagents, because such reactions are very fast and NO2 is a good electron acceptor. The following groups of compounds were tested: inorganic salts having reducing or polarizable anions, alkaline solutions of phenols and of beta-diketones, aromatic and aliphatic amines, and some control compounds such as alkali, sulfamic acid, and un-ionized phenols. It seems clear that NO2 is acting as an electrophilic reagent of about the same strength as benzenediazonium ion, reacting rapidly with phenoxide ions, less rapidly with aromatic bases, and not at all with aromatic amine cations or un-ionized phenols.

20520 APTIC NO. 39302

Nickol, G. B.

RANK ODOR METHOD FOR EVALUATING STACK GASES. *J. Air Pollution Control Assoc., 7(1):55, May 1957. (Presented at the Metropolitan Cincinnati Conference on Air Pollution Control Odor Control, Oct. 25, 1956.)*

The efficiency of a scrubber in removing odors from stack gases was determined by first submitting to a test panel various dilutions of unscrubbed gas samples collected in freeze-out traps. The testers were asked to rank the coded samples in an order from 1-4, assigning a value of 1 to the sample with the most odor and a value of 4 to the one with the least odor. The sum of the scores was used to indicate the freeze-out concentration which could be readily detected yet would not be strong enough to deaden the sense of smell. The concentration determined this way was used in subsequent rank order tests in which various dilutions of the freeze-out from the scrubbed gas were compared with it. The method was quite reliable and should be applicable in other instances.

20521 APTIC NO. 39562

Oppl, Ladislav

NATURAL VENTILATION IN TERMS OF DUST CONTROL. *(Naturliche Leuftung im Himblick auf die staubbekaempfung). Text in German. Staub, Reinhaltung Luft, 29(5):194-196, May 1969.*

Analagous to the equation for heat exchange between the air circulating in enclosed spaces in industrial plants and the supplied air, an expression for the concentration coefficient is derived which gives the ratio of dust concentration in the exhaust air. The relationship between the concentration coefficient and temperature coefficient is determined on the basis measurements in metallurgical works, and values for concentration coefficients are given for characteristic heat and dust sources.

20522 APTIC NO. 38914

Pierce, J. O. and J. H. Meyer

SAMPLING AND ANALYSIS CONSIDERATIONS IN EVALUATING LEVELS OF ATMOSPHERIC LEAD. *Atmos. Environ., 5(9):811-813, Sept. 1971. 5 refs.*

An investigation was undertaken to ascertain the accuracy and precision of estimating the total quantity of lead on membrane filters by analyzing only a segment of each filter and mathematically calculating the total amount. Relative accuracies of the atomic absorption spectrophotometry and the wet chemical (dithizone) method in analyzing for concentrations of lead in the presence of other contaminants from the urban environment were determined. Experiments were conducted with samples of filters obtained from sampling stations in rural and urban areas. The estimated range of the quantities of lead per filter was from 274-4168 micrograms. Statistical analysis of the data led to the conclusion that the precision with which the quantity of lead on a filter may be estimated from the analysis of one segment is inconsistent from one filter to the next. From the evidence at hand it could not be concluded that the estimate based on one 50% segment is more precise or more accurate than that based on one 10% segment from a filter. The average relative response of the method of atomic absorption compared with the wet chemical method varied between 0.92 and 0.98, and the observed precision of the method of atomic absorption was better than that of the wet chemical method. Where conclusions have to be drawn from a single filter or from a limited number of filters, the whole filter membrane should be analyzed rather than segments of it. When comparison of the performance of different analytical laboratories is the purpose, separate sections from a single filter paper should not be used to compare analytical accuracies. (Author summary modified)

20523 APTIC NO. 38976

Popl, M., V. Dolansky, and J. Mostecky

THE SEPARATION OF POLYCYCLIC AROMATIC HYDROCARBONS. *J. Chromatog., 59(2):329-334, 1971. 9 refs.*

The separation of mixtures of polycyclic aromatic hydrocarbons in a column packed with alumina wetted with 2% by wt water was accomplished by eluting with a gradient of cyclopentane-ether. By means of a flow-through quartz cell and an ultraviolet spectrophotometer, the extinctions of the eluted components at 260, 275, and 296 nm were recorded at 30-second intervals. The separations obtained with a mixture of standards and a coal tar pitch extract are illustrated. The method is sensitive, allowing the detection of 0.5 micrograms 3,4-benzopyrene without amplification. It is also rapid (2.5 hr), and the small amount of sample required (0.1-0.5 mg) makes it suitable for determining polycyclic aromatic hydrocarbons in foodstuffs and air.

20524 APTIC NO. 39436

Potter, Allen E.

PRACTICAL CONSIDERATIONS IN SOURCE TESTING. *Preprint, Oakland Univ., Rochester, Mich. 18p., 1971. 8 refs. (Presented at the Conference on Air Pollution Control, Annual, Rochester, Mich, Nov. 3-4, 1971.)*

Source testing provides data necessary for determining the extent of air pollution and methods for its control. Practical guidelines for selecting the type of source testing best suited to a particular application are presented. The fundamentals of representative and isokinetic sampling and testing at fully developed flow conditions are outlined. Three classes of tests are discussed: Preliminary survey, diagnostic, and emission inventory. The uses, technical characteristics, and benefits of each class are reviewed in detail. Hypothetical examples of the uses of these tests in industry are given.

20525 APTIC NO. 39200

Rex, P. C. and D. L. R. Bailey

ACCURACY OF MEASUREMENT OF LOW CONCENTRATIONS OF SULPHUR DIOXIDE. *Ministry of Technology, Stevenage (England), Warren Spring Lab., Rept. LR102(AP), 10p., Sept. 1969. 2 refs.*

The accuracy of measurement of low concentrations of sulfur dioxide from variations in the amount of sulfate and acidity measured in drechsel bottles containing hydrogen peroxide solution was determined in order to detect changes in the level of this pollutant at background sites. The drechsel bottles sampled SO2 from a mixing bottle supplied with low concentrations of the gas over a range of 5-100 micrograms/cu m from a diffusion generator. For the ranges of concentration of 5-10 and 10-25 micrograms/cu m, the accuracy was within plus or minus 1.5 and 2 micrograms/cu m respectively for 80% of the tests. For higher ranges of concentration of 25-50 and 50-100 micrograms/cu m, the accuracy was within plus or minus 3 and 4 micrograms/cu m respectively for 85% of the tests. The accuracy of the measurement as determined by the variation of acidity for the range of concentration of 8-100 micrograms/cu m was within plus or minus 3 micrograms/cu m for 85% of the tests. (Author conclusions modified)

20526 APTIC NO. 39040

Riediger, Guenther

PARTICLE COUNTS AND PARTICLE SIZE ANALYSIS AS PERFORMED WITH THE QUANTITATIVE QUANTIMET 720 TELEMICROSCOPE. *(Teilchenzaehlung und Teilchengroessenanalyse mit dem quantitativen Fernseh-Microskop Quantimet 720). Text in German. Staub, Reinhaltung Luft, 32(3):96-100, March 1972. 12 refs.*

Applications and problems in using the image analyzing computer Quantimet 720 to measure dust in evaluating konimeter samples are examined. A relatively low power objective was used because of the depth of focus and the speed of evaluating these in routine work. The instrument was, therefore, used down to its resolution limit. If well defined optical and electronic conditions are observed, the results are satisfactory. The measurements are reproducible and without subjective errors.

20527 APTIC NO. 39600

Rims, Lothar

OPTICAL SMOKE DETECTOR. *(Optischer Rauchdetektor). Text in German. (Preussag A. G., Bad Oldesloe (West Germany)) W. Ger. Pat. Appl. 2,023,463. 8p., May 13, 1970. 2 refs. (12 claims).*

An optical smoke detector with two light sensitive elements within a measuring cell is presented. When smoke enters the cell, differential scattering of the light causes the relative intensities of the light falling on each detector to vary. The two detectors are placed behind a plate with two different diameter light stops and out of direct illumination by the light source. One detector points toward its associated light stop and the other away from its associated hole. The diameters are such that under normal conditions, the two detectors are approximately equally illuminated by internally reflected light, but when smoke enters the cell, the changes in scattering of the light causes the incident light on the cells to vary. The detector is rather insensitive to dusy depositions; sensitivity does not change during operation.

20528 APTIC NO. 39154

Saendig, R. and R. Saendig

COMPARATIVE MEASUREMENTS WITH TWO SAMPLERS FOR SO2 ANALYSIS IN ATMOSPHERIC AIR. *(Vergleichsmessung zweier Probenahmegeraete zur SO2-Bestimmung in der atmosphaerischen Luft). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(3):172-174, March 1972. 6 refs.*

The determination of sulfur dioxide concentrations in ambient air according to the standard West and Gaeke method and a new SO2 measuring unit is compared. In the new sampler, the air sample is drawn in by a low-voltage membrane pump supplied with a nickel-cadmium accumulator. One charge of the accumulator lasts for 180-250 samples. Interferences by connecting lines are avoided through direct exposure of the absorber filled with tetrachloromercurate. The samples are analyzed by the pararosaniline method with a colorimeter. The advantages of the new sampler, over the conventional method include independence of the mains and portability. A statistical evaluation of 325 SO2 measurements taken in parallel with the two samplers determined that both methods agree within 10%.

20529 APTIC NO. 39577

Saringer-Kertesz, Magdolna and Jeno Havas

DETERMINATION OF CHLORIDE CONTENT IN THE FREE AIR AND IN THE WATER-SOLUBLE AEROPLANKTON FRACTION WITH A CHLORIDE SELECTIVE MEMBRANE ELECTRODE. *(A kloridionok koncentraciojanak meghatarozasa a szabad levegoben es az aeroplankton vizben oldhato frakciojaban klorid-szelektiv membrane elektroddal). Text in Hungarian. Egeszsegtudomany, 16(1):77-84, 1972. 3 refs.*

An ion selective chloride electrode was used to determine chloride and hydrogen chloride concentrations in the ambient air and the water-soluble chloride content of sedimenting powder and aerosol. The results are reproducible within + or 10%. The lower limit of reproduction is 0.035 mg Cl/l, equal to 0.0175 mg Cl/cu Nm (0.0179 HCl/cu Nm), if 5 ml of the sampling solution and 10 l of air are pumped over. The maximum permissible HCl concentration in residential areas is 0.20 mg/cu m; the upper hygienic limit, therefore, exceeds by far the lower limit of measurement and the method can be used for routine measuring of emissions in residential areas.

20530 APTIC NO. 38813

Sawicki, Carole R. and Frank P. Scaringelli

COLORIMETRIC DETERMINATION OF NITRATE AFTER HYDRAZINE REDUCTION TO NITRITE. *Microchem. J., 16(4):657-672, Dec. 1971. 26 refs.*

Since nitrate could be a precarcinogen or a pretoxicant, several sensitive, reproducible manual methods for the determination of nitrate based on the copper-catalyzed reduction of nitrate to nitrite with hydrazine sulfate were developed. Optimum conditions were obtained using sulfanilamide and N-(1-naphthyl)ethylenediamine dihydrochloride as the color-developing reagent. Two new and even more sensitive pairs of reagents for nitrate analysis are introduced that do not involve the use of a possibly carcinogenic naphthylamine. These were 4-amino-acetophenone and azulene or 8-anilino-1-naphthalenesulfonic acid. (Author summary)

20531 APTIC NO. 39307

Schmid, W.

MEASURING OF EMISSIONS AND IMMISSIONS IN THE ORGANIC CHEMICAL INDUSTRIES. *(Emissions- und Immissionsmessungen in der organischchemischen Industrie). Text in German. Eidgenoessische Kommission fuer Lufthygiene, Zurich (Switzerland), Probleme der Luftverunreinigung durch die Industrie, p. 23-25, 1968. (Sept. 9-10.) (Presented at the Schweizerisches Treffen fuer Chemie, 2nd, Basel, Switzerland.)*

In a chemical industrial plant, such as the Geigy works, emission measurements are made with regard to individual manufacturing localities. They start with a sampling of waste gas or air, which is aspirated and forced through water bottles or impingers for absorption of gaseous and liquid aerosols. Dust contained in the gas sample is separated by means of small cyclones or fiber glass filters. Simultaneously, volumetric measuring of the gas flow has to take place. Besides the laboratory, Geigy has a room for testing pilot air purification equipment, using artificially polluted air under controlled conditions. Test pollutants are produced by various means, such as evaporation and sublimation. For simulating dust emissions, and automatic weighing device and a vibrator are used to obtain the desired dosage. Dispersion testing involves the use of wind gauges with recording devices. An effective method of measuring sulfur dioxide concentrations is to bring the test stream of air in contact with a reaction fluid containing hydrogen peroxide. The change of electric conductivity of the resulting sulfuric acid solution, compared with that of the original reaction fluid, represents a direct measure of the SO2 concentration in the air being tested. Other methods of analysis where gas chromatography is employed in the determination of sulfur dioxide, hydrogen sulfide, and some hydrocarbons are described.

20532 APTIC NO. 39165

Schmit, J. A., R. A. Henry, R. C. Williams, and J. F. Dieckman

APPLICATION OF HIGH SPEED REVERSED-PHASE LIQUID CHROMATOGRAPHY. *J. Chromatographic Sci., 9(11):645-651, Nov. 1971. 17 refs.*

The operation and applications of reversed-phase liquid-liquid partition chromatography using high molecular weight polymers coated or bonded to the surface of Zipax chromatographic support are examined. The apparatus is described, and the effects of column temperature on efficiency and retention time, change in retention with modifier percentage and type, and the approximate relationship for predicting capacity ratio values as a function of column temperature, modifier, and modifier percentage are considered. The method was applied to the determination of fused ring aromatics and related compounds, auto exhaust condensate, organic solvent extracts of natural products, vitamins, and biochemicals. (Author abstract modified)

20533 APTIC NO. 39269

Schneeberger, R. F. and D. P. Springston

AEROSOL SAMPLING AND SIZE ANALYSIS IN THE 10 AND 250 MICRON REGION. (FINAL REPORT). *Cornell Aeronautical Lab., Inc., Buffalo, N. Y., Dept. of Army Contract DAAA-15-67-C-0578, Task 1B562602A08402, CAL Rept. AG-2473-E-1, 99p., Sept. 1968. 9 refs.*

NTIS, DDC: AD 841126

Aerosol sampling and size analysis was investigated with regard to the sampling efficiency of several aerosol sampling devices and the study of the feasibility of approaches to particle size distribution instrumentation. The AK sampler, the cascade impactor, the all-glass impinger, and the Edgewood Snoot were tested in controlled aerosol distributions in laminar and turbulent flow using mass balance and optical techniques. Calibration curves were constructed for the tested samplers. In the second area, particle sampling devices based on impaction phenomena were selected for and subjected to feasibility experiments. The approch selected offers significant promise for particles in the 10-250 micron range. (Author abstract modified)

20534 APTIC NO. 39714

Schweyer, H. E.

SPECTRAL ABSORPTION OF ASPHALTIC MATERIALS. *Anal. Chem., 30(2): 205-209, Feb. 1958. 13 refs.*

An exploratory study of the absorption of ultraviolet and infrared energy by several asphaltic materials was conducted in an effort to explain differences in these materials, and included consideration of the applicability of the Beer-Lambert law to asphalts dissolved in a mixture of iso-octane and l-butanol for ultraviolet absorption, and in carbon tetrachloride and thin films for infrared absorption. Typical spectrograms are illustrate for several asphalts. The ultraviolet absorption curves for most straight asphalts are similar, and the asphalts cannot be characterized by ultraviolet analyses alone, although use of this technique to study components separated from the asphalts may provide valuable information. Infrared data indicate a decrease in absorptivity coefficient as the aromaticity increases at those wave lengths generally attributed to CH2 and Ch3 groups. All processed asphalts show lower absorption than their source residua. The results do not appear to show that asphalts or their components in gross fractions can be characterized specifically by their spectral absorption.

20535 APTIC NO. 38953

Scott, D. W.

MEASUREMENTS OF TOTAL OXIDANTS IN THE ATMOSPHERE. *Warren Spring Lab., Stevenage (England), LR-140-(AP), 21p., Oct. 1970.*

A Dutch method and a Warren Spring Laboratory (WSL) method for determining total oxidants in air were compared using a prepared ozone/oxygen mixture. Both methods use potassium iodide absorbing solutions, with sodium thiosulfate to bind the liberated iodine, and buffer solutions of mixed sodium and potassium phosphates. However, the methods differ in the strengths of the buffer solutions and in analytical procedures employed to measure the ozone absorbed. The Dutch method uses spectrophotometric analysis and the WSL method uses titration analysis. The WSL method gave results which were 83.5% of those obtained by the Dutch method when measuring ozone levels of 2000-3000 micrograms/cu m. The 16.5% discrepancy was due not to differences in analytical procedures but to the weaker WSL buffer solution, which apparently allowed pH to rise during sampling. The solutions specified in the Dutch method can be combined with titration analysis to give satisfactory results in the field.

20536 APTIC NO. 39673

Scribner, Bourdon F.

SPECTROGRAPHIC ANALYSIS IN AIR POLLUTION STUDIES. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 231-235. 11 refs. (May 3-5, Louis C. McCabe, ed.)*

Spectrographic methods are useful for the rapid determination of about 70 chemical elements in dusts, fumes, air, and animal and plant ashes. The elements that are not readily determined are the gases, halogens, and metalloids, including sulfur. Its inherently high sensitivity makes the method useful for special problems in air contamination involving free or combined metallic elements. Direct analysis of air has been made for lead, and this method may possibly be extended to the direct determination of other elements. Principles of operation, factors affecting sensitivity, classes of elements in relation to spectroscopic sensitivity, aspects of quantitative spectrographic analysis, and reports in the literature on studies with particular elements and types of samples are briefly reviewed.

20537 APTIC NO. 39491

Selheimer, C. W. and Howard Bauman

FUME ANALYSIS AND PROCESS DESIGN CALCULATIONS. *Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):574-594, Aug. 1954. 9 refs.*

The development and use of two procedures for the analysis of fumes from paint and varnish manufacturing processes are presented. In the first procedure, water scrubber and water condenser fractions are combined and then separated into oil and water layers. After a sodium fusion test, litmus paper tests, and solubility tests, the oil layers and water layers are separated into solubility classes. The second procedure is a simplified sampling and analysis scheme that yields data from which the effectiveness and cost of the common fume disposal systems can be calculated for any given process.

20538 APTIC NO. 39172

Sharrah, J. S.

THE SIGNIFICANCE OF INSTANTANEOUS PEAK CONCENTRATIONS IN AIR POLLUTION. *APCA (Air Pollut. Contr. Ass.) News, 2(5):3-4, July 1954. (Presented at the American Industrial Hygiene Association Annual Meeting, Los Angeles, Calif., April 18-23, 1953.)*

As determined by measurements of sulfur dioxide, hydrogen sulfide, and carbon monoxide at different times and places, peak contaminant concentrations at any particular spot can be far in excess of the average concentration. These peak concentrations are one of the most important factors in air pollution. A knowledge of their effects, duration, and frequencies is necessary to assess the health aspect of pollution. Vegetation damage is a direct result of peaks and some material damage is attributable to them, e.g. discoloration of lead-base paints by sulfides. A knowledge of peak concentrations is also necessary to handle complaints about odors and particulate matter. Several surveys were made in various areas such as industrial areas and streets. The length of sampling time can influence the measurement results.

20539 APTIC NO. 39365

Shinkarenko, L. S., S. M. Dmitriev, and L. I. Bavika

DETERMINATION OF CARBOXYLIC ACIDS IN THE AIR. *(Opredeleniye karbonovykh kislot v vozdukhe). Text in Russian. Neftepererab. Neftekhim. no. 10:40-41, 1971. 5 refs.*

A quick method for the determination of carboxylic acids in the air is presented. Air samples containing Cl-ClO acids are passed through ethylene glycole (5ml) containing porous plate absorbers at 3.0-4.0 l/min rates. Aliquots (2ml) of the absorbing liquid are then treated with concentrated sulfuric acid, and kept at 90 C for 30 min. Test tubes are then treated with alkaline hydroxylamine (1.5 ml) and an acid iron chloride reagent (2.0 ml). THe coloration obtained is compared with a standard series of solutions prepared with acetic acid. Optical density reading is made at 500 millimicron. Sensitivity of the procedure reaches 0.005 mg/5.5 ml and its duration is 60-80 min shorter than that of the methanol technique.

20540 APTIC NO. 39088

Shleien, B., R. G. Heatherton, P. F. Hildebrandt, L. B. Lockhart, Jr., R. S. Morse, W. Stein, D. E. Van Farowe, and A. Hull

TENTATIVE METHOD OF ANALYSIS FOR TRITIUM CONTENT OF THE ATMOSPHERE. *Health Lab. Sci., 8(2):107-110, April 1971. 4 refs.*

A method is described suitable for sampling periods of several days, over the entire significant range of tritium concentration in air. Air is pumped at a sampling rate of approximately 100-150 cu cm/min through a silica gel column which collects moisture from the air. The collected moisture sample is then removed from the column or collection device and is analyzed for tritium. A suitable volume of collected moisture is mixed with scintillation solution, and the mixture counted in a liquid scintillation beta counter. The air flow rate and the total volume of moisture collected during the sampling period, or the absolute humidity, must be determined to convert the concentration of tritium in the collected moisture sample to its concentration in air. Range and sensitivity, precision and accuracy, apparatus, reagents, procedure, calibration, standards, calculations, and effects of storage are indicated.

20541 APTIC NO. 39721

Shurkhal, V. A.

THE CALCULATION OF THE CONSUMPTION OF AIR AND THE AMOUNT OF WASTE GAS DURING SINTERING OF IRON ORE MIXES. *Izv. Vysshekh. Uchebn. Zavedenii Chernaya Met., 12(10):26-29, 1969. Translated from Russian. British Iron and Steel Industry Translation Service, London (England), 6p., Jan. 1971.*

A method for calculating the consumption of air and the amount of waste gas formed, based on a chemical analysis of the latter, is examined. Values calculated from the chemical composition of waste gases include rate of air flow, volume of waste gas in the sinter bed and in the leaked air, and the combustion reaction. Under actual operating conditions, the waste gases contained carbon dioxide, oxygen, carbon monoxide, hydrogen, and nitrogen; the total amount of air used in sintering the charge was 445,850 cu m/hr.

20542 APTIC NO. 39742

Silverman, Leslie and Carlos Valenzuela

FILTER PAPER COLLECTION OF CADMIUM AND IRON FUMES IN AIR. *J. Ind. Hyg. Toxicol., 28(3):107-111, May 1946. 9 refs.*

The efficiency of the filter paper method for the collection of cadmium and iron fumes in air was reported. The apparatus consisted of a funnel-type filter paper holder connected in series with an electrostatic precipitator. Chemical analyses of the cadmium samples were performed by a rapid polarographic procedure. Iron analyses were performed by the mercaptoacetic acid procedure. Data indicate the collection efficiency of several analytical papers for cadmium and iron is high and uniform. Efficiencies of 95% and greater were obtained with cadm[illegible] oxide and 99% or greater with iron oxide. Within the range[illegible]died, no effect of concentration, fume age, or sampling rate was evident in determining the efficiency against either cadmium or iron fumes. Cadmium fume concentration varied from 0.01 to 31.7 mg/cu m. Iron oxide concentrations varied from 3.1 to 12.0 mg/cu m. Fume ages varied from freshly generated to 2 hr for cadmium and 50 min for iron. For cadmium, sampling rates varied from 1 to 2.5 cfm. Two cfm was used for iron fume sampling. The studies indicated that the filter paper method can be used for the field collection of cadmium or iron fumes. The efficiency of collection is equal or greater than other methods in use in 1946. (Author summary modified)

20543 APTIC NO. 39143

Simecek, Jaroslav and Milos Pulkrabek

ON MEASUREMENTS OF THE PARTICLE SIZE OF GLASS FIBER DUST. *(K mereni velikosti prachu ze sklenenych vlaken). Text in Czech. Pracovni Lekar. (Prague), 24(1):14-17, 1972. 6 refs.*

The accuracy, reproducibility, and comparability of measurement results of glass fiber dust particle size distribution as determined by optical microscopy, sedimentation pipettes, and the Leitz sedimentometer were examined. The microscopic method tested the effect of sample preparation and of the number of measured fibrillar particles on the accuracy of determination of the particle size distribution. Measurement results determined good reproducibility and approximately equal accuracy within + or 10% for all the methods. The results of the sedimentation methods, however, differed significantly from those of the microscopic method, which was more suitable for the given purpose.

20544 APTIC NO. 39669

Smith, J. H. and G. L. Rounds

METHOD OF TESTING OPEN HEARTH PRECIPITATORS. *Iron Steel Engr., 34(6):139-141, June 1957.*

Methods and equipment used to test the efficency of open hearth precipitators were discussed. Careful testing was required to actually determinethe true cleaning efficiency of the precipitators. During each test an engineer was stationed on the charging floor to record all data pertinent to that particular heat. Rate of fuel consumption, air flow, furnace pressure, periods of the heat, additions to the furnace, the number of furnace doors open, the characteristics of the slag, plus any additional information was recorded. Velocity distribution within the precipitator, velocity determination in the outlet flue, and velocity determination in the inlet flue were calculated. The sampling equipment consisted of a standard sampling probe with removable nozzles. The nozzles could be charged to cope with different gas velocities. A standard condenser, meter, and air pump were also incorporated in the sampling train. Particulate matter was separated from the gases by using standard paper thimbles. A dry method was incorporated for cleaning the probes. The method incorporated a standard shotgun cleaning rod with an appropriate sized brass bristle brush. All material within the probes was brushed and wrapped into the thimbles before the thimble holder was detached from the probe.

20545 APTIC NO. 38963

Smith, R. G., R. J. Bryan, M. Feldstein, B. Levadie, F. A. Miller, E. R. Stephens, and N. G. White

TENTATIVE METHOD OF ANALYSIS FOR LOW MOLECULAR WEIGHT ALIPHATIC ALDEHYDES IN THE ATMOSPHERE. *Health Lab. Sci., 9(1):75-78, Jan. 1972. 3 refs.*

Formaldehyde, acrolein, and low molecular weight aldehydes can be collected in 1% sodium hydrogen sulfite solution in midget impingers. Formaldehyde is measured in an aliquot of the collection medium by the chromotropic acid procedure, acrolein by a modified mercuric chloridehexylresorcinol procedure, and carbon 2 to carbon 5 aldehydes by a gas chromatographic procedure. Details of procedure, range and sensitivity, interferences, precision and accuracy, apparatus, reagents, calculations, storage effects, and calibration are given.

20546 APTIC NO. 38972

Smith, R. G., R. J. Bryan, M. Feldstein, B. Levadie, F. A. Miller, E. R. Stephens, and N. G. White

TENTATIVE METHOD OF ANALYSIS FOR METHANE AND CARBON MONOXIDE CONTENT OF THE ATMOSPHERE (GAS CHROMATOGRAPHIC METHOD BY REDUCTION TO METHANE). *Health Lab. Sci., 9(1):58-61, Jan. 1972. 2 refs.*

In method described, an air sample is introduced onto a prechromatographic or stripper column, which passes the methane and carbon monoxide quantitatively to the gas chromatograph. The gas chromatographic column separates the methane from the carbon monoxide. The methane is eluted first from the gas chromatographic column through a catalytic reduction tube into a flame ionization detector. The carbon monoxide is eluted next into the catalytic reduction tube and is reduced to methane before entering the detector. The response of the detector is directly proportional to the weight of the hydrocarbon in the carrier gas stream. Range and sensitivity, interference, precision and accuracy, details of procedure and apparatus, and calibration of the analyzer are given.

20547 APTIC NO. 38979

Smith, R. G., R. J. Bryan, M. Feldstein, B. Levadie, F. A. Miller, E. R. Stephens, and N. G. White

TENTATIVE METHOD OF ANALYSIS FOR CARBON MONOXIDE CONTENT OF THE ATMOSPHERE (HOPCALITE METHOD). *Health Lab. Sci., 9(1):84-87, Jan. 1972. 12 refs.*

A method is described for the intermittent sampling and analysis of carbon monoxide concentrations normally exceeding 50 ppm in air. Air containing CO is passed over an oxidation catalyst (Hopcalite) where the CO is oxidized to carbon dioxide. The heat of oxidation results in a temperature increase in the air stream which is proportional to the CO concentration. Range and sensitivity, interferences, precision and accuracy, apparatus, reagents, procedure, calibration and standardization, and calculations are given.

20548 APTIC NO. 39175

Springer, Karl J.

STUDIES OF PUBLIC OPINION OF A TRAFFIC ODOR. *Preprint, Environmental Protection Agency, Washington, D. C., 26p., 1971. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Public opinion of diesel exhaust in terms of the Turk kit panel rating of the same odor was examined to relate technology, measurement, and response and to gauge control effectiveness, preparation of standards, and measurement methodology. Procedures for the opinion survey, mobile test laboratory design, and questionnaire construction are reviewed. The results of surveys in San Antonio, Chicago, St. Louis, Philadelphia, and Los Angeles are presented. In general, the ratings of diesel exhaust odors by the public were related to the intensities and qualities those odors were judged to possess by a trained odor evaluation panel. This result permits the evaluation of the effectiveness of odor control methods in terms of the approximate extent to which their use would reduce adverse response to diesel exhaust odor.

20549 APTIC NO. 39129

Stedman, D. H., E. E. Daby, F. Stuhl, and H. Niki

ANALYSIS OF OZONE AND NITRIC OXIDE BY A CHEMILUMINESCENT METHOD IN LABORATORY AND ATMOSPHERIC STUDIES OF PHOTOCHEMICAL SMOG. *J. Air Pollution Control Assoc., 22(4):260-263, April 1972. 23 refs.*

A prototype instrument monitoring ozone or nitric oxide was used for photochemical smog studies in the laboratory and the atmosphere. The principle of the detector is based on the chemiluminescent reaction 03 + NO yield oxygen + nitrogen dioxide. The major features are selective response to the gas being measured, sensitivity in the ppb range, linearity over a factor of 10 to the 6th power in concentration, and rapid time response. Detector operation, calibration, and laboratory and urban atmospheric measurement results are examined. (Author abstract modified)

20550 APTIC NO. 38784

Stegmaier, Robert B., Jr.

AIR POLLUTION - PARTICULATE MATTERS. VOLUME I. OCTOBER 1942- DECEMBER 1970. *Defense Documentation Center, Alexandria, Va., DDC-TAS-70-90-1, 133p., May 1971. 98 refs.*

NTIS: AD 723900

A bibliography of 98 references on the analysis of atmospheric aerosols and particulate matter is presented. References are included for studies on aerosols; sampling methods; dust deposition; diffusion; gravimetric analysis; effects of particle size; meteorologic phenomena, atmospheric pollution, and altitude variations; light scattering; simulated atmospheres; effects on human health; regional distributions; chemical reactions and interrelationships; dust microscopy; measurements of smoke, mists, haze, fog, and constituent trace elements; chemical compositions of dusts; particulate emissions from various sources; and x-ray infrared spectroscopy. An abstract and key descriptors are given with each reference, and computer-generated subject and author indexes are included.

20551 APTIC NO. 38774

Stevens, D. C. and J. Stephenson

A SIZE SELECTIVE DUST SAMPLER WHICH CONFORMS TO THE LUNG MODEL PROPOSED BY THE I.C.R.P. TASK GROUP ON LUNG DYNAMICS. *Aerosol Sci., vol. 3:15-23, Feb. 1972. 7 refs.*

A single stage size selective sampler was made having a particle separation characteristic nearly idential to the theoretical particle size-pulmonary deposition curve published by the International Congress on Radiation Protection Task Group on Lung Dynamics. Monodisperse polystyrene, thoria, and uranyl acetate particles were used to obtain size-deposition curves for production models of a 2 l/min sampler for use as a personal air sampler, and a prototype 30 l/min sampler. The design of the sampler allows a considerable amount of flexibility in the choice of separation characteristics and it is believed that the sampler could be modified to conform to any future changes in the lung model deposition curves. (Author abstract modified) 0

20552 APTIC NO. 39325

Suzuki, Takeo, Toshiichi Okita, Shigezi Koshi, Sadao Omichi, Toshio Hasegawa, Hiroshi Watanabe, and Hiroshi Kosaka

COMPARATIVE MEASUREMENTS OF ATMOSPHERIC PARTICULATE MATTER USING LOW VOLUME AIR SAMPLERS, LIGHT SCATTERING AEROSOL RECORDERS AND TAPE AIR SAMPLERS. *(Ro boryumu ea sanpura, kosanrangata biryushi nodokei, tepu ea sanpura ni yoru taikichu fuyu ryushijo busshitsu nodo no hikaku sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(3):329-335, Dec. 1971. 4 refs.*

Comparative measuremetns of atmospheric particulate matter were taken at four monitoring stations using three sampling methods. Th 23-hour mean weight concentration of particulates below 10 micron was determined from the data of a low-volume air sampler, while hourly levels of particulate concentration were continuously recorded by a light-scattering aerosol recorder and tape air sampler. The 23-hour mean values of particulate concentration as determined by the three methods are compared, with computations for the correlation coefficients between each of the methods.

20553 APTIC NO. 39693

Todd, D. B. and W. B. Wilson

USE OF TRACERS IN REFINERY STUDIES. STACK LOSS OF CATALYST FROM COMMERCIAL CATALYTIC CRACKING UNITS. *Ind. Chem. Eng., 49(1):20-24, Jan. 1957. 1 ref.*

The use of radioactive tracers for the determination of the rate of loss of fresh catalyst from catalytic cracking units was described. The isotopes used, scandium 46 and cerium-144, were strongly adsorbed by the catalyst, and a method of impregnating was used which resulted in a uniform deposition. The evolution of a satisfactory stack fines sampler was outlined, where the gas flow is easily measured and all the fines are collected on adequately supported glass filter paper. The sampler can be used as a routine analytical aid in following the daily fluctuations in stack loss of catalyst if a satisfactory sampling port is available. Its use in determining the loss rate of fresh catalyst was demonstrated in tests on two catalytic cracking units. The cumulative loss of fresh catalyst from two regenerators is approximated by a power function of time. In a third regenerator, a concentration gradient across the stack radius was shown to exist. (Author summary modified)

20554 APTIC NO. 39055

Tohata, Heichiro

ODOR CONTROL TECHNOLOGY. *(Akushu boshi gijutsu). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 36(3):240-244, March 1972.*

A panel discussion on odor control is discussed. The technical difficulties involving the instrumental measurements of odor-causing substances are mentioned, and the validity of the values obtained by the present gas chromatographic techniques is questioned. Designation of odor-causing substances with their control criteria as done in the recent Offensive Odor Control Law is still premature at this time, in that fundamental studies remain to be completed. Gas chromatography is designated by the Law as the standard measuring method. Odor tests by humans are preferred to the instrumental tests. Measurement methods include air dilution, water dilution, and gas chromatography. Deodorization methods include combustion, absorption, adsorption, ozone, neutralization, and masking. Of the five panel members, one favored gas chromatography, two the olefactory test, and one was undecided.

20555 APTIC NO. 39014

Touhata, Heiichiro

STUDIES ON THE METHODS OF MEASUREMENT AND PREVENTIVE MEASURES OF POISONOUS GAS. *(Yugai gasu sokuteiho oyobi haishutsu boshiho no kenkyu). Text in Japanese. Tokyo Metropolitan Environmental Protection Research Inst. (Japan), 136p., Feb. 1971.*

Experiments were made to eliminate benzene, toluene, and xylene by means of catalytic combustion, platinum compounds were the most effective catalyzers. Gas chromatography was used for the analysis. Hydrogen cyanide was well absorbed by an aqueous solution of sodium hydroxide; using fillers and when L/G was 5 l/cu m and the rate was 1.0 m/sec, the concentration of 100 ppm of exhaust gas was reduced to 0.1 ppm. The measurement was made by means of the titration of silver nitrate and the spectrophotometry of pyridine-pyrazolone. Chlorine and bromine were absorbed by the solution of sodium hydroxide, and studies were made on the estimation of bromine by means of spectrophotometry and the ion electrode method. The spectrophotometry of amino-antipyrine and nitrophenol was used for the estimation of phenol, and the gross volume of each phenol and cresol allotrope was obtained. The phenol, nitro-phenol, and amino-antipyrine were estimated. The color reactions of nitro-phenol and aminopantipyrine indicated that the estimation of phenol by dissimilation of petroleum was possible with an error of 5% and 10% respectively.

20556 APTIC NO. 39072

Tulbovich, B. I.

DETERMINATION OF SMALL CONCENTRATIONS OF SOME HALOHYDROCARBONS IN THE AIR. *(Opredeleniye malykh kontsentratsiy nekotorykh galoidouglevodorodov v vozdukhe). Text in Russian. Gigiena i Sanit., 36(8):76-77, 1971. 5 refs.*

A method for the determination of halogenated hydrocarbons such as dichloropropane (DCP), chlorobromopropane (CBP), and dibromopropane (DBP), occurring in small amounts in the air is presented. Gas-liquid chromatography using a flame ionization detector and nitrogen as a carrier gas was the most suitable technique. Polyetyleneglycole of molecular weight 2000 appeared to be the most selective liquid phase when applied in a 15% proportion with respect to the carrier. Qualitative determination of DCP, CBP and DBP was performed according to the retention times of the respective pure compounds. Optimization studies established the following parameters to be chosen for quantitative analysis: column length: 200 cm, internal diameter: 4.0 mm; thermostated column temperature: 130 C; carrier gas expenditure: 200 ml/min. The retention times for DCP, CBP and DBP were 1.0 min and 3.0 sec, 1.0 min and 30 sec, and 2.0 min and 33 sec, respectively. Sensitivity of the method reached 0.001 mg/l.

20557 APTIC NO. 39292

Turk, Amos

APPRAISAL OF ODOR PROBLEMS. *Air Repair, 4(2):3-6, 34, Aug. 1954. 16 refs.*

The role of analytical methods in the appraisal of odor problems in air pollution is reviewed. Activated carbon, silica gel, activated alumina, and various active earths may be utilized for sampling by adsorption. Specific odorous gases or simple mixtures may sometimes be collected by absorbing devices, including bubblers, packed towers, and spiral absorbers. Direct spectrometric analysis of solutions is sometimes valuable, using double-beam infrared equipment which makes it possible to record directly the difference between the spectrum of the pure solvent and the solution. Collection of odorants by condensation at low temperatures has distinct advantages over any other collection method. Samples collected by any of these methods may be analyzed by conventional, spectrometric, chromatographic, or other special methods, examples are cited. The appraisal of odor abatement methods or equipment should consider counteraction, masking, adsorption, incineration, catalytic combustion, and scrubbing.

20558 APTIC NO. 38982

Volz, Frederic E.

INFRARED REFRACTIVE INDEX OF ATMOSPHERIC AEROSOL SUBSTANCES. *Appl. Optics, 11(4):755-759, April 1972. 11 refs.*

The optical constants in the infrared from lambda 2.5 to 40 micron of dry natural aerosol substances and of sea salt are presented. The aerosol substances were obtained from rain and snow water: dust and soot by sedimentation, and water soluble salts by evaporation. The spectra of the absorption index were derived from previously published transmittance measurements of potassium bromide disks. The real part of the refractive index was calculated from the specular reflectance at near normal incidence of disks of pure aerosol substance. The observed spectral features are being related to chemical constituents, notably sulfates and alcohol soluble organics. Optical constants of composite and wet aerosol are discussed. A simple model confirms the measured transmission of a coarse dry powder of water solubles and shows that the extinction by natural aerosol should have a minimum near 8 micron and a strong maximum near 9 micron. Mie scattering calculations based on the reported data are in progress. (Author abstract modified)

20559 APTIC NO. 39120

Vooren, P. H. and P. B. Meyer

MEASUREMENT OF PARTICLE SIZE IN AQUEOUS AEROSOLS. *Am. Ind. Hyg. Assoc. J., 32(2):134-138, Feb. 1971. 8 refs.*

Aqueous aerosols have many applications in the investigation and treatment of lung diseases. A technique for making aqueous aerosol droplets visible to measure particle size is compared to the thermal precipitator method. The droplets were collected on a millipore membrane filter and dyed, and size was determined using microphotographs of the particles. All droplets were classified according to size by comparison with circles on a plastic overlay. The droplet size distributions for counts of 10,000 droplets were virtually the same by the millipore filter method and the thermal precipitator. The membrane filter method, however, allows isokinetic sampling and is quicker and much simpler.

20560 APTIC NO. 39644

Wenzel, Bernice M.

PRACTICAL APPLICATIONS OF OLFACTOMETRY. *Proc. Sci. Sect. Toilet Goods Assoc., vol. 14:27-29, 1950. 19 refs.*

The results of olfactometry consist principally of thresholds or limits of sensitivity stated in whatever unit the experimental apparatus dictates. A set of olfactometric tables would be useful if they listed at least absolute and relative thresholds and preferably recognition thresholds; provided thresholds for all odorous substances in pure form; and adopted some standard method of threshold determination, including a unit of measurement. Olfactory thresholds are important in industrial applications notably for public utilities concerned with gas and water supply. Other applications are in the medical field, for example, measuring thresholds for different substances as a function of the presence of certain sex hormones in the blood.

20561 APTIC NO. 39639

Whytlaw-Gray, R. and J. B. Speakman

SMOKES: PART II.--A METHOD OF DETERMINING THE SIZE OF THE PARTICLES IN SMOKES. *Proc. Roy. Soc. London, 102(A718):615-627, Feb. 1, 1923. 10 refs.*

In Part I an ultra-microscopic method of counting the particles in dilute and highly disperse solid-gas systems was described, and while the number decreased as the cloud aged, a concurrent growth occurred in the size of the individual units. These changes in the case of non-volatile oxide smokes were proved to be caused by the aggregating of the smaller particles to form larger complexes. In order to follow this process in a quantitative manner, it was necessary to determine the average mass of a particle at different periods in the age of the smoke. Because of the large volume of dilute smoke involved, filtration was employed to determine the total weight in a given volume, and the mean mass per particle was deduced by counting simultaneously the number in the same volume. A measured volume of cloud, usually 1 liter, was sucked through a small asbestos filter, and its increase in weight determined on a microbalance. The experimental procedure is described. A preliminary study of various aerosols has shown that in all the cases examined, the smaller particles aggregate rapidly together, giving complexes of different structure depending on the chemical nature of the substance dispersed. This process explains quantitatively the observed decrease in the number of particles. Aggregation is rapid when the cloud is first formed, and ceases after a period varying from .5 to 4 hr. All aerosols during the first stage of their life history contain a relatively large proportion of matter, either in the molecular state or as amicroscopic particles. (Author conclusions modified)

20562 APTIC NO. 39288

Williams, Charles R. and Leslie Silverman

COLLECTION OF FLUORIDE FUMES IN AIR. *J. Ind. Hyg. Toxicol., 27(4):115-117, April 1945. 3 refs.*

Laboratory and field tests of fluoride fumes in air indicate that these fumes occur as particulate fluorides with very little gaseous hydrogen fluoride. Both types of studies indicate that the filter paper method can be used for the collection of fluoride fumes in air. Whatman No. 44 and Eaton and Dikeman No. 613-21 give efficiencies approaching 100%. The efficiencies of four papers tested against fluoride fumes is in proportion to their air flow resistance. (Author summary modified)

20563 APTIC NO. 39368

Wronski, Mieczyslaw

THE APPLICATION OF DITHIOFLUORESCEIN AND TETRAMERCURATED FLUORESCEIN FOR ESTIMATION OF HYDROGEN SULFIDE, HYDROGEN CYANIDE AND THIOLS BY MEANS OF DETECTOR TUBES. *(Zastosowanie dwutiofluoresceiny i czterorteciofluoresceiny do oznaczania siarkowodoru, cyjanowodoru i tioli za pomoca rurek wskaznikowych). Text in Polish. Chem. Anal. (Warsaw), 16(2):439-441, 1971. 4 refs.*

An analytical method for the determination of hydrogen sulfide, hydrogen cyanide, and thiols is examined. The detector tubes contain a cellulose powder impregnated with specified compounds to indicate the various pollutants. Impregnation with dithiofluorescein-o-hydroxymercuribenzoic acid indicates H2S by a blue color; tetramercurated fluorescein indicates H2S by a decay of fluorescence. A tetramercurated fluorescein biuret indicates hydrogen cyanide and thiols by a yellow fluorescence. The sensitivity of the (phi equals 5 mm)-indicator tubes ranged within 0.03-0.06 mcirograms/mm.

20564 APTIC NO. 38792

Yeremin, V. N. and V. P. Osokhin

PREVENTION OF LOSSES IN THE DETERMINATION OF THE DUST PARTICLE SIZE DISTRIBUTION BY MEANS OF A GRAVIMETRIC SEDIMENTATION METHOD. *(Ustranenie poter pri opredelenii dispersnogo sostava pyli vesovym metodom sedimentatsii). Text in Russian. Zavodsk. Lab. (Moscow), 38(1):36-37, 1972. 3 refs.*

Errors in the determination of particle size distributions of dusts smaller than 40 micron are primarily associated with losses during analysis. Such losses can be reduced or eliminated if the distance of the scale base to the bottom of the receptacle is decreased and the ratio of the receptacle to the scale diameter is increased. In addition, the scale edge should be removed from the zone of the convective currents, with the scale base maintained at the original level. The methods for sediment collection on the scale and for determination of the specific gravity of the settled suspension should be combined to determine the particle size distribution. Formulae are given for determination of the build-up weights and the maximum variations in the scale weight under different conditions. Losses were studied with corundum dust in three scales of different heights (0.1, 4.7, and 7.92 cm). The respective losses were 20.5%, 2.3% and 0%.

20565 APTIC NO. 39207

Yuan, H. C.

USE OF NUCLEAR TECHNIQUES IN THE MEASUREMENT AND CONTROL OF ENVIRONMENTAL POLLUTION. REPORT OF THE IAEA SYMPOSIUM HELD IN SALZBURG, AUSTRIA, FROM 26 TO 30 OCTOBER 1970. *At. Energy Rev., vol 9:229-236, 1971.*

Papers presented at the International Atomic Energy Agency Symposium held in Salzburg, Austria, in 1970 are briefly summarized Subjects include the application of activation analysis, tracer techniques, and other nucleonic instrumental methods in the following areas: measurement of air pollutants and their dispersion; identification and analysis of water pollutants; contamination by mercury and other metallic compounds; organic pollutants and pesticide residues; pollutants and ecosystems; and sludge and waste-water treatment.

20566 APTIC NO. 39017

Zebel, Guenter and Dieter Hochrainer

CONTRIBUTION TO THE FINE DUST PARTICLE SIZE DISTRIBUTION MEASUREMENT BY MEANS OF AN IMPROVED SPECTROSCOPIC IMPACTOR. *(Zur Messung der Grossenverteilung des Feinstaubes mit einem verbesserten Spektralimpaktor). Text in German. Staub, Reinhaltung Luft, 32(3):91-95, March 1972. 5 refs.*

A spectroscopic impactor for the determination of particle size distribution was tested on aerosols in coal mines. The impactor deposits aerosol particles of aerodynamic diameters ranging within 0.5-5.0 micron according to their size on a single stage. Concentric flows of clean air and aerosol are joined, accelerated, and aerodynamically focused in a round nozzle. The particles are deposited on a slide, with the larger particles closer to the center. The calculated calibration from the flow-field model was in qualitative agreement with the empirical calibrations.

AIR QUALITY MEASUREMENTS

20567 APTIC NO. 38898

Kanagawa Prefecture (Japan), Atmosphere Noise Section

RESULTS OF SURVEY ON DAMAGE DONE BY PHOTOCHEMICAL POLLUTION (GENERAL). *(Kokagaku kogai higai jokyo chosa kekka (Sogo-hen)). Text in Japanese. 5p., Sept. 1971.*

Damage done to the Kanagawa Prefectural residents by photochemical pollution during the May 31-Sept. 20, 1971 period was surveyed. The results are tabulated by time and place with the number of sufferes, symptoms, and measured symptoms included eye and throat irritation, coughing, difficulty breathing, and headaches. Air monitoring stations and the areas damaged are mapped.

20568 APTIC NO. 39001

Gifu Prefectural Public Health Research Inst. (Japan)

INVESTIGATION OF DUST FALL IN GIFU, OGAKI, AND TAJIMI CITIES. *(Gifu-shi, Ogaki-shi, oyobi Tajimi-shi ni okeru kokabaijin chosa). Text in Japanese. Gifu-ken Eisei Kenkyusho Nenho (Annu. Rep. Gifu Prefect. Inst. Pub. Hyg.), no. 14:23-25, 1968.*

Measured data during 1968 were collected by cities and months. Total amount of dust fall (T), as well as unsoluble substance (A), and soluble substance (A1) in dust fall were shown. Unsoluble substance was further divided into tar and ash content (B). The B/A decreased with strong heating, C/A, and A/T, soluble substance into chlorine ion, sulfate ion, and A1/T, and measured values were shown according to these items.

20569 APTIC NO. 39002

Kanagawa Prefecture Center for Public Nuisance Control (Japan)

ON STATE OF AIR POLLUTION (WITH SULFUR OXIDES) AND ISSUANCE OF EMERGENCY ALARM IN KANAGAWA PREFECTURE (ESPECIALLY YOKOHAMA-KAWASAKI AREA). *(Kanagawa-ken ni okeru taiki osen (iwo sankabutsu) to kinkyuji hatsurei jokyo ni tsuite (tokuni Yokohama-Kawasaki chiiki ni tsuite)). Text in Japanese. 4p., Jan. 19, 1972.*

Air pollution with sulfur oxides in Kanagawa Prefecture has been gradually decreasing since 1967. Except in part of Yokohama and Kawasaki Cities, the pollution has lessened to a level that is almost meeting the environmental criteria. The alarm is issued when the sulfur oxides concentration continues to exceed 0.2 ppm. The alarm was issued 7 times (lasting for total of 35 hr 40 min) in 1967, 8 times (45 hr 25 min), in 1968, 9 times (26 hr 15 min) in 1969, 9 times (21 hr) in 1970, and none in 1971. Pollution with sulfur oxides has decreased at almost all the measuring locations throughout the prefecture over the past three years. The quantity of SOx emitted from factories subject to inspection in case of the emergency alarm was 13,000 N cu m/hr in Dec. 1969, 10,518 N cu m/hr in Dec.

1970, and 9,0108 N cu m/hr in 1971, indicating a considerable decrease each year. This improvement is considered to have resulted from the Prefecture s control policy and the measures implemented. One control measure is that all factories or facilities built in and after 1968 are required to reduce SOx emission by 30%. Use of low-sulfur heavy oil or gas fuel, improvement of manufacturing facilities, and installation of desulfurization devices all contributed to reduction of SOx emissions. Now that SOx pollution has been brought under control, the big problem is the control of the suspended dust causing smog. Installation of dust collectors and other control measures needs to be promoted.

20570 APTIC NO. 39004

Kanagawa Prefecture Center for Public Nuisance Control (Japan)

OUTLINE OF PHOTOCHEMICAL POLLUTION OCCURRENCE IN KANAGAWA PREFECTURE. *(Kanagawa-ken ni okeru kokagaku kogai hassei jokyo no gaiyo). Text in Japanese. 2p., Sept. 1971.*

Photochemical pollution alarms were issued 10 times in Kanagawa Prefecture. Concentration of oxidant was highest during 1200-1500 hours, then gradually decreased. The meteorological characteristics of the day included: 4 km or less for the visible distance at 900 hours; 3 m/sec or lower wind velocity in the polluted area; the daytime weather was fine or cloudy; the highest temperature was 25 C or higher; MMD 1500 m or less for atmospheric stability; 5 m/sec for wind velocity at 1500 m altitude and 15 m/sec or lower for wind velocity at about 3100 m altitude. Areas more affected by the pollution were found in the mountain skirts and valleys some distance away from downtown. Increases in the concentration of oxidant over Kanagawa Prefecture tends to be governed by the state of sea wind fronts from Tokyo and Sagami Rays. Nitrogen dioxide rises before the oxidants, and there are occasions where NO2 decreased with the ascension of oxidant as is typical of the Los Angeles-type smog. Concentration of oxidants gradually decreases from sunset and never rises at night. It gradually increases as from 8 o clock the following morning and reaches a peak during 1200-1500 hours. The coastal area reaches the peak about 1-2 hours earlier than the inland area.

20571 APTIC NO. 39054

Shimizu Municipal Office (Japan)

SURVEY REPORT ON ENVIRONMENTAL CONDITIONS (CONCERNING ATMOSPHERE). *(Kankyo joken chosa hokoku (Taiki kankei)). Text in Japanese. Rept., 4-(1), 21p. March 1972.*

The air pollution survey of Shimizu City, Shizuoka Prefecture has been going on since Sept. 1967. This report primarily deals with the survey results for Sept. 1970 through Aug. 1971 and briefly discusses on the trend for the past 4 yrs. Air pollutants centering around sulfur oxides are measured at 31 selected spots in the city. Settling dusts, sulfur oxides, and fluorides are measured. The results are broken down by the measuring spot, method, month, and season. Heavy oil fuel consumption as well as weather conditions during the period are also discussed. The FY 1970 heavy oil consumption is estimated at 585,000 kl, of which about 440,000 kl (76%) was consumed in Miho District and 100,000 kl (16%) in or about the municipal office area. The most prevailing wind was NE (18%), followed by NNE (14%), and ENE and SW, 6% each as in the preceding year. The year had 36 rainy days with rainfall amounting to 1,730.8 mm, compared with 1,015 mm in the previous year. The precipitating dust was 6.3 tons/sq m/mo in average at Shimizu Municipal Office, 7.0 t at the Miho Fire Station, and 6.1 t at the Sodeshi Citizens Hall, all indicating a decrease by 10-25% from the previous year. Results obtained by lead dioxide method indicated that the high-concentration pollution zones (12 mg sulfur trioxide/100 sq cm PbO2/day) observed in the previous year disappeared this fiscal year while the medium-concentration pollution (1.0 mg SO3/100 sq cm PbO2/day) expanded to engulf more areas. The annual average for 10 spots in Shimizu municipal area was 0.82 mg SO3/100 sq cm PbO2/day indicating a decrease from the previous year s 0.95 mg. Pollution with fluoride has been negligible with no notable change again this year. As to the 4-year trend of the pollutants, both the soluble and insoluble content of the precipitating dust decreased each year, while the pH value fluctuated with the highest recorded early in 1970. The 0.5-1.0 mg SO3/100 sq cm PbO2/day zone is expanding while the 1.5-2.0 mg zone remains the same or decreases.

20572 APTIC NO. 39081

Suginami Ward Office, Tokyo (Japan), Construction Div.

INTERIM REPORT OF ENVIRONMENT SURVEY, APRIL 1971-SEPT. 1971. *(Kankyo chosa no chukan hokoku, 46nen 4gatsu-46nen 9gatsu). Text in Japanese. 107p., Oct. 1971.*

An automotive exhaust gas survey, a night environmental noise survey, photochemical smog, and statistics of grievances on public nuisance are discussed, and the related statistics for FY 1969 and 1970 are given. For the automotive exhaust gas survey, concentrations of carbon monoxide and lead and traffic were measured at seven selected locations in Suginami Ward once a month during 5 mo. An infrared analyzer for carbon monoxide and the atomic absorption photometric analyzer for lead were used. The 5-month averages at the roadside in front of the Suginami Ward Office were 7.6 ppm for CO along the road, 3.1 ppm for CO behind the road, 1.4 micrograms/cu m for lead and 4017 cars/hr traffic. The high-concentration zone appears even at the same measuring spot, depending on wind direction, wind velocity, and availability of sidewalk and buildings around. The CO concentration alongside the road is 2 or 3 times that behind the road and CO tends to increase with traffic increase, giving a higher CO value in July. The night noise survey was made at eight selected locations for 4 mo, May and June through Sept. 1971. The measured values are shown in a number of tables and charts. From the data, one location was exceeding the legally stipulated allowable noise level. In the photochemical smog section, the alarm level of air pollution or oxidant concentration and measures and procedures to be taken in such a case or in case of actual photochemical smog emergency were shown extracted from Air Pollution Control Law and Tokyo Metropolitan Ordinances. The statistics show that the photochemical smog alarm was issued in Tokyo for 13 times in 1971; once in May, seven times in June, and five times in July. The grievances received were 28 in April, 31 in May, 53 in June, 51 in July, 39 in August, and 37 in September.

20573 APTIC NO. 39139

Gifu Prefectural Public Health Research Inst. (Japan)

EXAMINATION OF AIR POLLUTION IN OGAKI CITY BY AUTOMATIC MEASURING EQUIPMENT FOR SULFUR DIOXIDE. *(Aryusan gasu jidousokuteiki ni yoru Ogaki-shi no taikiosen chosa). Text in Japanese. Gifu-ken Eisei Kenkyusho Nenho (Annu. Rep. Gifu Prefect. Inst. Pub. Hyg.), no. 14:21-23, 1968.*

Sulfur dioxide, dust, wind direction, and wind velocity were continuosly observed in 1968. Characteristics of the wind direction in Ogaki City is that appearance of the northwest wind is significant (30.8%) throughout a year. Such high concentrations of SO2 as 10 pphm resulted from the pollutants from industrial districts transferred by the southerly wind in summer and by the northwest wind from autumn to winter. Concentration of SO2 is low during night, rapidly increases between 5 and 9 o clock and shows a peak at 10 o clock. Average concentration below 5 pphm during a day occurred in 90.2% of the total days. The 1-hour value of SO2 below 10 pphm was 97.5%. The mean concentration for a year was 3.1 pphm; the maximum value was 21.5 pphm and was such a severe concentration as to need an urgent countermeasure was not observed. Annual mean value of dust was 0.12 mg/cu m. As compared with other industrial cities, contamination was not so evident.

20574 APTIC NO. 39099

Andersen, Ib

RELATIONSHIPS BETWEEN OUTDOOR AND INDOOR AIR POLLUTION. *Atmos. Environ., 6(4):275-278, April 1972. 18 refs.*

Paired 24-hour samples of sulfur dioxide and suspended particulate matter were studied outside and inside a room for 7 and 1/2 months. The indoor concentrations of SO2 and suspended particulate matter were, on the average, 51 and 69%, respectively, of the simultaneous outdoor values. For the two pollutants, the coefficients of correlation between indoor and outdoor values were 0.52 and 0.83 respectively. The factors which determine the concentration level of a pollutant in a room are discussed, and stress is placed on the medical-hygienic importance of increasing the effects of building materials in reducing pollution. (Author abstract modified)

20575 APTIC NO. 39182

Bourbon, P.

ANALYTICAL PROBLEMS POSED BY POLLUTION BY FLUORINE COMPOUNDS. *(Probleme analytique du dosage de l ion fluor). Text in French. National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 174-176. (Oct. 4-7, Paper VI/6.)*

Analytical problems from fluoride pollution are discussed; a critical analysis of air sampling methods is made. Discussions are illustrated by determinations carried out at 20 sampling locations situated at a 20 km radius around an aluminum factory of one of the Pyrenean valleys in France. Sampling methods focus the utilization of an impinger which is a modification of the Greenberg-Smith device and which allows accumulation of fluorine ions 70 ml of 0.1 N sodium hydroxide solutions with no dust or hydrogen fluoride interference. Determinations of F ion were made monthly. Fluorine containing dusts were determined at a 1.0 km radius around the factory whereby separation from hydrogen fluoride was carried out with Millipore filters (0.8 micron pores). These filters were utilized when sampling was made in dry weather conditions and heated air flows (80 C) were bubbled into NaOH containing impingers. The amounts of HF carried along did not exceed 5.0% of the total amount of fluorine thus trapped. Additional information was obtained from F ion determinations carried out on rain water samples at the 20 pluviometer network installed at a 10 km radius around the factory. Determinations made once monthly according to the Spanos-Zirconium method showed only the presence of ionisable fluorine in the rain water. Of the thoroughly described sample preparation and analytical methods the Lanthane-Alizarine-complexone specrophotometric procedure was the best one for below 10 micrograms F ion in 50 ml aliquots. Average values (from 100 samples) showed F ion from hf to be 57% and F ion from dust to constitute 47%. The dust composition included coke, tar, aluminum trioxide (50-60% of the dust weight), sodium carbonate and sodium sulfate (traces), and fluorine compounds. Fluorine pollution ranged from 0-3.0 micrograms/cu m referred to as F ion. Amounts below the 1.0 micrograms/cu m level were the most frequent. Extreme values of 10 20 micrograms/cu m were found incidentally in the immediate vicinity of the plant under inversions.

20576 APTIC NO. 39185

Breuer, W. and K. Winkler

SOURCES AND DISTRIBUTION OF AIR POLLUTIONS ASCERTAINED BY STATIONARY RECORDING OF GASEOUS COMPONENTS. *(Herkunft und Ausbreitung von Luftverunreinigungen, ermittelt durch stationaere Registrierung mehrerer Immissionskomponenten). Text in German. National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 239-242. 5 refs. (Oct. 4-7, Paper VII/10.)*

The monitoring station located north-east of Leverkusen constitutes a part of the Bayer plant air monitoring network which includes 12 stationary and one mobile units. The Leverkusen station is provided with devices for measuring sulfur dioxide, carbon monoxide, carbon dioxide, hydrocarbons (expressed as ppm methane and determined by a flame ionization detector), nitric oxide and nitrogen dioxide, hydrogen sulfide, chlorine, dust, and aerosols (light scattering measurements). Air quality measurements are made at 15 m above the ground surface. A map of the location of the monitoring station is reproduced. Peak emissions of CO2, CO, NOX, methane, and dust (in dry weather) are recorded at the end of each working day coinciding with the departure of the worker-owned vehicles and under east wind conditions. The vol/vol ratios of these pollutants are CO2/CO/NOX/Methane equal 100/22/0.35/12. Continuous measurement of meteorological parameters such as temperature gradient of the 200 m layer of ground level atmosphere and wind direction and velocity are carried out also. Statistical data analysis on half hour average values accumulated between Jan. 1. and Feb. 15, 1966 and grouped according to wind direction provided a picture on the expected emissions according to emission source location; the subdivision of the wind rose was made according to the location of seven main emission sources. Higher SO2 emissions from chemical industries and minimum NOX values from the same direction indicated lack of automobile traffic. Peak values for all pollutants appeared when NE ENE winds, were blowing. Since no traffic or domestic emission sources are available in that direction, these values may be due to variable inversion frequency and wind velocity. The continuous inversion conditions associated with SE or SSE winds lead to continuous accumulation of pollutants. However, under these conditions, peak concentrations below those carried by the NE ENE winds occur because of lack of emission sources in the southern direction.

20577 APTIC NO. 38830

Chuang, Tsin-yuan

AIR POLLUTION AND CONTROL MEASURES IN TAIPEI CITY. *(Taipei-shih kung-chi wu-jan chih hsien-chuang yu chi kuan-chih tui-tse). Text in Chinese. Kung Ch eng (Eng. J.), 44(8/9):85-109, Aug./Sept. 1971. 22 refs.*

Air quality was measured in Taipei city to determine the level of air pollution. The annual average dust fall was calculated at 18.51 ton/sq km/mo with a standard deviation of 6.48 tons; however, 53% of the pollution load, excepting fuel combustion products, is water soluble. Suspended particulate matter from steel mills, brick factories, and coking plants was also measured. Approximate concentrations of 0.06 ppm for sulfur dioxide, 6-8 ppm of carbon monoxide, and 0.026 ppm of nitrogen dioxide were established. Monitored SO2 observations also indicated radiation inversions at certain times of the day. The problems of air pollution are aggravated by the increasing population, 80% of which is concentrated in the urban areas. Meteorologically, the situation is favorable toward dispersion of pollutants, since periods of calm occur only 2.73% of the time and the average annual wind velocity is 3.23 m/sec. Topographic interactions, however, may have adverse influences on wind movements and velocity. The wind direction is generally easterly, thus bringing in pollution from the Nankang and Neihu industries.

20578 APTIC NO. 38734

Derouane, Alain

COMPARING SMOKE CONCENTRATIONS OUTDOORS AND WITHIN DWELLING INTERIORS. *(Comparaison des concentrations en fumees a l exterieur et a l interieur des lieux d habitation). Text in French. Atmos. Environ., 6(3):209-220, March 1972. 7 refs.*

Smoke concentration within and outside of two buildings in Brussels was compared. Measurement data for an administrative building and a private home are tabulated with respect to season and concentration correlations. Both in summer and winter, and for each measurement, the average smoke concentrations outside were greater than concentrations inside. The indoor concentration represented 66-87% of the outdoor concentration. The concentrations were closely correlated, determining the dependence of indoor concentrations on outdoor concentrations when indoor pollution sources are absent.

20579 APTIC NO. 39184

Detrie, J. P.

STATISTICAL STUDIES OF THE EMISSIONS IN PARIS AND THE DEPARTMENT DE LA SEINE. *(Etudes statistiques des emissions dans Paris et le departement de la Seine). Text in French. National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 219-223. (Oct. 4-7, Paper VII/3.)*

Statistical analysis of fuel consumption for heating purposes (both domestic and industrial) and sulfur dioxide pollution data, accumulated in six years (1959-1965) in the Paris area and in the Seine district, is presented. An irregular 6.0% annual increase in total fuel consumption in the Seine district was ascertained. Although utilization of domestic oil with the lowest sulfur content (0.5% S) increased annually by 20%, a 4.0% annual increase in SO2 occurred in this district due to the utilization of heavy oil (containing 3.0% S) by the industries. Average values for the entire Paris area showed a minor decrease in SO2 of the annual average, of the most polluted month average, despite the general increasing trend of emissions. This is due to the new electric power plants provided with high stacks, which allow better SO2 dispersion, and to the increased utilization of low S oil fuel for domestic heating. The monthly SO2 levels appear to be affected by industrial rather than by domestic sources, even in winter, in the Seine district. Another graph reproduces diurnal data illustrating the contribution of the meteorological parameters to the air pollution picture. Highest pollution levels coincide with winds coming from South-East directions and corresponding to anticyclonic situations producing temperature inversions. Perfect correlation between the monthly temperature variations, fuel consumption, and SO2 levels in the Paris air was found. A slight decrease of SO2 pollution was ascertained in 1965, attributed to governmental orders outlined in 1964. Further studies on three hourly observation basis with sampling points, scattered throughout the Paris area, will be carried out during 1966-1967. Measurement points were installed at different altitude levels on the Saint Jacques tower (60 m) and on the Eiffel tower (100 and 200 m) for evaluating vertical dispersion processes.

20580 APTIC NO. 39482

Ewing, Robert A. and Janet K. Baker

AIR POLLUTANT EMISSION INVENTORY FOR THE STATE OF MONTANA. *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Office of Air Programs Contract 68-02-0040, Task 2, 97p., Sept. 30, 1971. 41 refs.*

NTIS: PB 204383

The annual emission of the five principal air pollutants (particulates, sulfur dioxide, carbon monoxide, hydrocarbon, and nitrogen dioxide) in the state of Montana was estimated as of 1970. Data were obtained from voluntary responses to questionnaires sent out by the state, supplemented by various published references on fuel usage and area emissions, plus numerous personal communications from a number of knowledgeable Montanans. Point-source process losses are responsible for nearly all of the SO2 emitted in the State (90%). Principal sources of SO2 emissions are nonferrous metal smelters (85%) followed by oil refineries and utilities, each with 3%; the balance is accounted for by the industrial combustion of fuel. The same group of point sources accounts for about 1/3 of the particulate emissions. Additional substantial contributors are forestry and agricultural operations, including teepee burners and slash burning, estimated to contribute about 1/3, and forest wildfires and stubble burning, estimated to contribute about 1/4. Particulates and SO2 are point-source pollutants and are industrial problems. The individual consumer and homeowner is responsible for very little of the emissions of either of these. However, as an automobile operator, the individual citizen is responsible for most of the emissions of CO, HC, and NO2. These also come from operations such as slash burning, stubble burning, wildfires, and the industrial combustion of fuel. Controls on slash burning may be required to achieve desired air quality standards for these pollutants.

20581 APTIC NO. 39705

Gurinov, B. P. and F. I. Dubrovskaya

AIR POLLUTION FROM HIGH SULFUR CONTENT PETROLEUM EXTRACTING AND PROCESSING PLANTS. *(Zagryazneniye atmosfernogo vozdukha predpriyatiyami po dobyche i pererabotke mnogosernistykh neftey). Text in Russian. Gigiena i Sanit., 13(12):20-25, 1948.*

Air pollution with hydrogen sulfide from two different petroleum extraction and processing plants utilizing raw oil containing 0.5 and 12% free hydrogen sulfide was studied. Inquiries among the population dwelling in towns 1.5-3.5 km distant from the industrial plant boundaries produced complaints about smell and ill health from H2S. Vertical H2S profiles showed maximum concentrations ranging between 1.0-7.0 mg/cu m occurring up to 10 m from the ground surface level. The presence of H2S was ascertained in 100% of the air samples taken at 0.5, 0.8, and 1.5 km distances from the processing plants. Fog increased the amounts of H2S found in open air samples. Indoor air samples taken in apartments located north of the processing plants contained higher levels in H2S than outdoor samples, which was attributed to the domestic gas heating system. The main sources contributing to air pollution from petroleum processing include raw and intermediate material storage, combined distillation, cracking, alkaline purification of distillate cracking products, and leakings due to the highly corrosive action of H2S. Oil wells of the 12% H2S petroleum emitted 7 tons/24 hr of petroleum gas, including hydrocarbons and H2S.

20582 APTIC NO. 39432

Hoffman, Alan J.

METROPOLITAN INDIANAPOLIS AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub- APTD-0881, 54p., Dec. 1968. 11 refs.*

NTIS: PB 206819

An emission inventory of the Indianapolis metropolitan area is presented. Total emissions of sulfur oxides, particulates, carbon monoxide, hydrocarbons, and nitrogen oxides were estimated with respect to source type, season, and geographical distribution. The major sources of pollution included industrial processes, (concrete and asphalt batching plants, glass manufacturing plants, and oil refineries) steam-electric power plants, automotive exhausts, aircraft operations, domestic heating, and solid waste disposal. Data on fuel usage for coal, residual oil, distillate oil, and natural gas are tabulated. Point sources collectively accounted for 90% of the SOx, 81% of the particulates, 14% of the CO, 4% of the HC, and 49% of the Nox.

20583 APTIC NO. 39405

Jutzi, W.

LEAD CONTENT OF THE STREET DUST AND OF THE STREET ATMOSPHERE IN THE CITY OF ZURICH IN

THE SPRING OF 1970. (Bleigehalt des Strassenstaubs und der Strassenluft in der Stadt Zurich im Fruehjahr 1970). Text in German. Bull. Eidgenoess. Gesundheitsamtes, Beilage B, no. 3:77-83, March 1971. 2 refs.

Sedimentary dust was collected in the city of Zurich in 1970 with a dry brush. The dust sample was dried at 105 C, sifted, and particles of a diameter smaller than 0.15 mm were tested for their lead content by emission spectrography. A measured volume of air (40 cu m/h) was filtered through a tarred paper filter, and the amount of suspended dust was determined by weighing. The filter was then mineralized and lead was determined by atomic absorption spectrometry. Sampling was performed during the midday and evening rush hour. A comparison of results obtained in 1970 with those from 1963 revealed that while the lead content in the atmosphere increased at all points in the city where measurements were performed, the lead content in the sedimentary dust decreased everywhere. While the first observation is in accord with the increased traffic and concomitant emission of lead, the second observation is not easily explainable. One explanation could be the protracted rainy period preceding the sampling of the dust and the observation that in the spring atmospheric lead levels are generally lower. The median sedimentary dust lead content from 19 sampling sites was 0.52 pro mille in July 1948, 0.85 in Sept. 1948, 0.84 in March 1949, 1.03 in June 1949, 1.13 in Aug. 1950, 0.88 in March 1951, 2.06 in June 1955, and 1.06 in May 1970. The lead content in dust suspended in the atmosphere rose from 100% in 1963 to from 100-175% in 1970 in nine sampling sites. The median Pb contents in suspended dust were from 1.4 to 21 micrograms/cu m.

20584 APTIC NO. 38816

Kahl, H., P. Smolinka, W. Muschter, and G. Rittner

THE DUST IN THE AIR IN THE CAPITAL OF THE GERMAN DEMOCRATIC REPUBLIC - RESULTS OF EIGHT YEARS OF STUDIES. *(Die Staubniederschlagsimmission der Hauptstadt der DDR - Ergebnisse 8 Jaehriger Untersuchungen). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(2):94-99, Feb. 1972. 21 refs.*

In the capital of the German Democratic Republic which spans an area of 403 sq/km and which has a population of about 1.08 million people, dust sedimentation measurements were taken over a period of 8 yrs at 100 measuring sites spread throughout the capital. The dust was collected in containers filled with a fluid. The analytical evaluation was carried out by gravimetry. In the first 3 yrs only the undissolved dust fractions were determined, in the years from 1964 to 1967 the undissolved and dissolved fractions were determined and from 1967 onward only the total dust quantity was determined. Using a statistically obtained relationship between the total dust quantity and the two partial components, it was feasible to determine the total dust quantity for the years 1961 to 1963 by mathematical approximation. The measurements were terminated in 1968. The average total dust quantity (dissolved and undissolved) fluctuated over the first 4 yrs between 20 and 28 g/sq m/30 days, in the years 1967/68 between 13.5 and 14.5 g/sq m/30 days. The summer had higher values. The highest concentrations were measured in the three industrial centers of Rummelsburg, Herzbergstrasse, and Dimitroffstrasse. The frequency of exceeding the limit concentration of 20 g/sq m/30 days lies between 75 and 100%. About 20% of the total area of Berlin, in which 60% of the population reside, have an annual average dust concentration of more than 15 g/sq m/30 days.

20585 APTIC NO. 39340

Kirsch, H. and K. Schwinkowski

EMISSION MEASUREMENTS OF STYROL AND POSSIBILITIES FOR ITS LIMITATION IN THE WASTE GAS. *(Immissionsmessungen von Styrol und Moeglichkeiten der Begrenzung im Abgas). Text in German. Z. Hyg., 18(3):193-194, March 1972. 8 refs.*

Ground level concentrations of styrene in the vicinity of three plants processing glass-fiber reinforced polyesters were measured using a spectrophotometer. In all three cases the waste gases were discharged via low stacks. Sampling speed was 0.5 l/min; measurements were taken at distances of 50-600 m. The average of 57 measurements was 1.18 mg/cu m, with a maximum concentration of 5.45 mg/cu m. At a distance of 600 m, the concentration was still 0.38 mg/cu m, far above the maximum allowable concentration of 0.003 mg/cu m. The plants were in the immediate vicinity of residential areas. Thermal afterburning at 800 C and a residence time of the gas particles of at least 1-1.5 sec, adsorption, and absorption via spray towers, venturi scrubbers, and packed towers are considered as controls to reduce styrene concentration in the waste gases.

20586 APTIC NO. 39056

Koyama, Tahachiro and Tsunehiro Takada

DUST FALL AMOUNTS IN HARIMA AREA DURING FIVE YEARS (1965-1969). *(Saikin 5nenkan (1965-1969) no Harima chiiki no kokabaijin no jittai). Text in Japanese. Hyogo-ken Eisei Kenkyusho Kenkyu Hokoku (Rept. Environ. Sci. Inst. Hyogo Prefect.), no. 3:14-17, 1972.*

Annual and monthly fluctuations of dust fall amounts measured by an English standard deposit gauge were reported. The six sampling sites were within the seaside industrial district. Dust fall amounts of the residential and commercial districts decreased annually, but those of the rural district remained on almost the same level during 5 yrs. Monthly fluctuation at each sampling site tended to be generally high from April to July and to be low from October to February. This tendency was remarkable in the seaside industrial district, but it was not so clear in another district. The amount of soluble components in dust fall was small in iron and steel industrial district and was heavy in chemical industrial district. There was significant relationship between the amount of insoluble components and the amount of rainfall except at one sampling site. It was suggested that in studying the correlation between dust fall amount and frequency of wind direction, it is necessary to investigate respective correlations between the wind direction and the gross amount of dust fall, soluble components, and insoluble components in dust fall.

20587 APTIC NO. 39208

Lee, Robert E., Jr. and C. Frederick Smith

SIZE DISTRIBUTION OF SUSPENDED PARTICULATES FROM LIGNITE COMBUSTION. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 7p., 1971. 5 refs.*

The particle size distribution of aerosols emitted from the combustion of fuels having a high volatile content, e.g., lignite, was investigated in Ankara, Turkey and compared with that of suspended particulates in London, Cincinnati, and Philadelphia. Samples were collected with a cascade impactor and the size distribution was determined gravimetrically. The mass median diameter of particles in Ankara air ranged within 1.21-2.19 micron with an average MMD of 1.79 micron as compared with 0.54, 0.26, and 0.66 micron in Cincinnati, Philadelphia, and London, respectively. Aerosol dispersion in Ankara was broad. Although the aerosol concentration in Ankara was higher than that in the United States or England, the respirable fraction was low for equivalent concentrations, indicating that the inhalation hazard may be less in Ankara.

20588 APTIC NO. 39057

Mamuro, Tetsuo, Yatsuka Matsuda, Akira Mizohata, and Tadao Matsunami

ACTIVATION ANALYSIS OF AIRBORNE DUST. II. *(Taiki Fuyujin no Hoshaka Bunseki). Text in Japanese. Radioisotop. (Tokyo), 21(3):164-169, March 1972. 5 refs.*

Activation analyses of airborne dust samples which were collected at four sampling stations in Osaka and Sakai Cities were carried out, and the monthly average concentrations of various elements from March 1970 to March 1971 were determined. For most elements, the highest concentration appeared in November and December and the lowest in August. Somewhat lower peaks appeared around June. For several elements such as zinc, arsenic, and antimony changed values were obtained; they were significantly related to industrial activities. Automobile exhaust gases were supposed to be a main pollution source of bromine. Neutron activation, by which information on many elements could be easily obtained, was quite effective for grasping the actual situation of air pollution in an urban district. Other elements determined included sodium, aluminum, chlorine, potassium, vanadium, chromium, manganese, iron, barium, cobalt, and calcium.

20589 **APTIC NO. 39234**

Martin, Maurice

STUDY OF THE DUST CONTENT OF THE AIR IN DIFFERENT WORKING PLACES IN A FOUNDRY. *(Etude de l empoussierage de l air aux divers postes de travail en fonderie). Text in French. Fonderie (Paris), no. 286:22-29, Jan. 1970. 2 refs.*

Three different dust sampling methods are compared, and correlations between dust exposure index and silicosis hazards are investigated. Impingers, French ARM-type samplers with soluble tetrachloronaphthalene filters, and German Microsorban filters can be used for dust sampling in foundries. The formulae for the determination of hygienic indices with each of the three methods are compared. More than 1000 samples were taken by the ARM method in different shops of a foundry. The count of particles below 5 micron, and quartz ratios were determined by X-ray diffraction. Indices were determined from 854 measurements. In the evaluation of silicosis hazards by means of hygienic indices, the indices above six and between five and six are treated separately. With indices below five hazards can be regarded as non-existent, while indices above six indicate hazardous working places, on an 8-hr basis in both cases. The relative variations in silicosis hazards paralleled those of the indices.

20590 **APTIC NO. 38895**

Masek, Vaclav

NEWER FINDINGS CONCERNING THE PROPERTIES OF FLY DUST FROM COKING PLANTS. II. THE ARSENIC CONCENTRATION IN THE DUSTS DEVELOPING AT THE COKING PROCESS. *(Neue Erkenntnisse ueber die Eigenschaften des Flugstaubes aus der Kokerei. Teil II - Arsengehalt in den Luftstaeuben der Verkokung). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 22(3):69-74, March 1972. 10 refs.*

The dust and arsenic concentration in 19 samples taken at the upper floors of the hard coal and pitch blocks of the coke-oven furnace were measured. The soluble arsenic concentration was determined by boiling the sample with 2% sodium hydroxide solution. The total arsenic concentration was determined by a modified colorimetric method. The obtained arsenic was then determined by photometry with silverdiethyl dithiocarbamate. The average arsenic concentration of the raw material was 0.0005% by weight, in the dusts of the air samples it was 0.014% by weight, which means that the arsenic concentration in the emission is 28 times higher than in the initial coal used for the coking process. The dusts in the samples taken in the upper pitch blocks contain an arsenic concentration which is 182 times higher than the concentration in the coal. The quantities of soluble arsenic in the samples were negligible. The maximum allowable arsenic concentration in the air of working places of 0.3 mg As/cu m was never exceeded.

20591 **APTIC NO. 39431**

McGraw, Michael J. and Charles S. Holt

PITTSBURGH METROPOLITAN AREA AIR POLLUTION EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub- APTD-0895, 54p., Nov. 1968. 15 refs.*

NTIS: PB 207648

An emission inventory for the Pittsburgh metropolitan area is presented. Total emissions of sulfur oxides, particulates, carbon monoxide, nitrogen oxides, and hydrocarbons were estimated as a function of source type, season, and geographical distribution. The major sources included motor vehicles, industrial processes, steam-electric power plants, domestic heating, commercial and institutional fuel combustion, refuse disposal, incineration, open burning, aircraft, railroads, and vessels. Data on combustion of coal, residual and distillate fuel oils, and natural gas are tabulated.

20592 **APTIC NO. 39535**

Moore, Carl E.

SOME PHYSICAL AND BIOLIGICAL ASPECTS OF AIR POLLUTANTS. *IEEE Trans. Nucl. Sci., NS-18(1):13-18, Feb. 1971.*

Data are presented on lead concentrations (1969) in the Chicago Metropolitan Area and on monthly (1964-1969) concentrations of atmospheric particulates and lead in suspended particulates over Morton Grove, a Chicago suburb. Atmospheric lead concentrations in Morton Grove are slowly rising due to increased urbanization and heavier automobile traffic. Over the entire metropolitan area, lead levels are higher along major expressways than in less travelled districts. Results are also given for neutron activation analysis of Chicago air samples. The analysis identified some elements of known biologic interest, for example, zinc, cobalt, and selenium. In view of the exponential character of the growth curve associated with human activities, it is imperative that the effects of trace metals on biological systems be determined.

20593 **APTIC NO. 38994**

Noguchi, Masateru, Shigeru Sugiyama, Noboru Suzuki, Morio Ito, Yoshio Nakai, and Takeshi Nagai

INVESTIGATIONS OF AIR POLLUTION, REPORT NO.2, AIR POLLUTION IN THE YOSHIWARA AREA, SHIZUOKA PREFECTURE (JAN. 1965 - DEC. 1965). *(Taiki osen ni kansuru chosa, dainiho, Shizuoka-ken Yoshiwara chiku no taiki osen jokyo (Showa 40 nen 1 gatsu – Showa 40 nen 12 gatsu)). Text in Japanese. Shizuoka-ken Eisei Kenkyusho Nenpo (Annu. Rep. Shizuoka Pub. Health Lab.), vol. 15:176-184, Sept. 1969.*

The results of air quality measurements taken in the Yoshiwara area of Shizuoka Prefecture between January and December 1965 are presented. Settling particles were captured by a deposit gauge at 10 locations and the total amount, benzene-soluble organic matter and insoluble matter, and pH were measured. Sulfur trioxide was measured by the lead dioxide method; sulfur dioxide and suspended particulates were determined by the electroconductivity method. The monthly average of settling particles ranged from 5.86 g/sq m in Dec. to 1 .60 g/sq m in May, and averaged 9.79 g/sq m. This compared with 7.62 g/sq m in the controlled area (Hygienic Research Institute). The monthly average of benzene-insoluble organic matter ranged from 3.74 g/sq m in November to 12.59 in May, averaging 6.14 g/sq m. The controlled area average was 3.74 g/sq m. The monthly average of pH ranged from 4.10 in July to 5.9 in November, averaging 4.83. This compared with 5.7 for the controlled area average. The average SO3 ranged from 0.43 in June to 0.94 mg/100 sq cm in May, averaging 0.58 mg/100 sq cm/day. This compared with 0.19 mg/100 sq cm/day for the controlled area.

20594 APTIC NO. 38997

Noguchi, Masateru, Shigeru Sugiyama, Noboru Suzuki, Morio Ito, Yoshio Nakai, and Takeshi Nagai

INVESTIGATIONS OF AIR POLLUTION, REPORT NO.3, AIR POLLUTION IN THE YOSHIWARA AREA, SHIZUOKA PREFECTURE (JAN. 1966 - DEC. 1966). *(Taiki osen ni kansuru chosa, daisanpo, Shizuoka-ken Yoshiwara chiku no taiki osen jokyo (Showa 41 nen 1 gatsu - Showa 41 nen 12 gatsu)). Text in Japanese. Shizuoka-ken Eisei Kenkyusho Nenpo (Annu. Rep. Shizuoka Pub. Health Lab), vol. 15:185-191, Sept. 1969.*

The results of air quality measurements in the area of Shizuoka Prefecture between January and December 1966 are presented. The measured pollutants were settling particles, sulfur trioxide (by the lead dioxide method), sulfur dioxide (by the electroconductivity method), suspended particulates (by the electroconductivity method), benzene-soluble organic matter benzene-insoluble matter, and pH. The average amount of settling particles measured at 10 locations was 7.65 g/sq m/month. Benzene-soluble organic matter averaged 3.70 g/sq m/month, and insoluble matter, 4.23 g/sq m/month. The average pH was 5.0. Sulfur trioxide concentrations ranged from 0.39 to 1.35 mg/100 sq cm/day at 10 locations, and averaged 0.79 mg/100 sq cm day. Sulfur dioxide measured at the Hygienic Research Institute reached a maximum level of 0.232 ppm and a minimum of 0.006 ppm, averaging 0.052 ppm.

20595 APTIC NO. 38998

Noguchi, Masateru, Shigeru Sugiyama, Noboru Suzuki, Morio Ito, Yoshio Nakai, Takeshi Nagai, and Takako Sano

INVESTIGATIONS OF AIR POLLUTION, REPORT NO. 4, AIR POLLUTION IN THE YOSHIWARA AREA, SHIZUOKA PREFECTURE (JAN. 1967 - AUG. 1967). *(Taiki osen ni kansuru chosa, daiyonpo. Shizuoka-ken Yoshiwara chiku no taiki osen jokyo (Showa 42 nen 1 gatsu - Showa 42 nen 8 gatsu)). Text in Japanese. Shizuoka-ken Eisei Kenkyusho Nenpo (Annu. Rep. Shizuoka Pub. Health Lab.), vol. 15:192-196, Sept. 1969.*

Results of quality measurements taken in the Yoshiwara area of Shizuoka Prefecture from January to August 1967 are presented. Settling particles were captured by a deposit gauge at 10 locations and chlorine ion, total particulate amount, benzene-soluble organic matter and insoluble matter, and pH were measured. Sulfur trioxide was measured by the lead dioxide method; sulfur dioxide and suspended particulates were measured by the electroconductivity method. The monthly average of settling particles ranged from 3.28 g/sq m in January to 8.06 g/sq m in July, and averaged 6.76 g/sq m. This compared with 5.18 g/sq m in the controlled area (Hygienic Research Institute). The monthly average of benzene-soluble organic matter ranged from 1.32 g/sq m in May to 5.19 g/sq m in April, averaging 3.0 g/sq m. The controlled area figure was 2.52. The monthly average pH ranged from 4.25 in July to 5.8 in January, averaging 4.56, compared with 6.06 in the controlled area. The average chlorine ion ranged from 0.15 in May to 1.26 g/sq m/month in April. The average figure was approximately the same as in the controlled area -- 0.75 g/sq m. The monthly average of SO3 ranged from 0.70 for January to 1.14 in March and averaged 0.95 mg/100 sq cm/day. The controlled area average was extremely low at 0.28 mg/100 sq cm/day. Sulfur dioxide concentrations measured for three different periods at one location and two different periods at another location showed a high of 0.346 ppm and a low of 0.001 ppm.

20596 APTIC NO. 39046

Noguchi, Masateru, Shigeru Sugiyama, Yoshio Nakai, Takeshi Nagai, Takao Nagano, and Takako Sano

INVESTIGATIONS OF AIR POLLUTION, REPORT NO. 5, AIR POLLUTION IN THE YOSHIWARA AREA AND NEIGHBORING MUNICIPALITIES, SHIZUOKA PREFECTURE (SEPT. 1967 - DEC. 1967). *(Taiki osen ni kansuru chosa, daigoho, Shizuoka ken Yoshiwara chiku oyobi rinsetsushi, cho no taiki osen jokyo (Showa 42 nen 9 gatsu - Showa 42 nen 12 gatsu)). Text in Japanese. Shizuoka-ken Eisei Kenkyusho Nenpo (Annu Rep. Shizuoka Pub. Health Lab.), vol. 15:197-250, Sept. 1969 36 refs.*

The results of air quality measurements taken in the Yoshiwara area and neighboring municipalities of Shizuoka Prefecture between September and December 1967 are presented. Data were collected at 12 locations for settling particles, sulfur trioxide (lead dioxide method), sulfur dioxide (electroconductivity and Rosaniline methods), suspended particulates (hi-vol sampler), organic compounds (hi-vol sampler), and hydrogen disulfide (methylene blue method). Levels of suspended particles show a slight improvement over the years. The 1964 levels at 10 locations ranged from a low of 5.6 tons/yr to a high of 11.4 tons; the corresponding figures were 6.9 tons to 12.2 tons in 1965. In 1966 they decreased to 6.2 tons and 10.3 tons, respectively and in 1967 ranged from 4.5 tons to 8.7 tons. The monthly average between September and December 1967 for settling particles ranged from 2.957 g/sq m to 17.344 g/sq m at 12 locations. Average SO3 concentrations ranged from 0.502 mg to 1.5217 mg/100 sq cm/day; the average for 12 locations was 0.9992 mg. Sulfur dioxide concentrations ranged from 0.45 ppm to 0.01 ppm at one location, averaging 0.044 ppm. High-volume sampler measurement of suspended particulates showed a low of 0.093 mg/cu m and a high of 0.415 mg/cu m. Benzene-soluble organic matter ranged from 0.012 to 0.0385 mg/cu m.

20597 APTIC NO. 39402

Pasko, L. I. and F. Kh. Yunusov

AIR POLLUTION IN WASTE-WATER CLEANING PREMISES. *(O sostoyanii vozdushnoy sredy na ochistnykh sooruzheniyakh). Text in Russian. Bezop. Tr. Prom., 15(1):46-48, Jan. 1971.*

Results of air and water samplings at waste water treatment plants of the petroleum processing industry in the USSR are described. Waste waters to be treated contain 21-1000 ml/l water of petroleum products and 3-120 ml/l of hydrogen sulfide. Air samplings around waste water treatment installations such as oil traps, settling tanks, and sludge pits revealed considerable concentrations of hydrocarbons (up to 472 mg/cu m), H2S, and carbon dioxide due to the respective high concentrations of such products and de-emulsifiers in the waste water. The gaseous emissions were much higher around open-air installations than at closed plants. Hydrocarbons such as methane, ethane, propane, butane, and pentane were present in almost every sample. One cu m of treated waste water to be discharged released 6-120 l gaseous pollutants. The H2S content of the waste water was reduced from 124 to 4.9 mg/l at an installation by means of technological improvements. A maximum carbon dioxide concentration of 40 mg/l in waste water was determined. Hydrogen sulfide concentrations of 5-6 mg/cu m in the air were measured in one case. The synergetic effect of the different pollutants should be regarded as considerable. In order to improve the working conditions of the exposed personnel, enclosed waste water treatment systems are recommended.

20598 APTIC NO. 39063

Seki, Toshihiko, Hidehiko Hoshikawa, Morio Suzuki, and Tadashi Kanno

THE CONCENTRATIONS OF EXHAUST GASES AT THE MAIN INTERSECTIONS IN SENDAI. *(Sendai shinai shuyo kosaten ni okeru rojo haikigasu nodo ni tsuite). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst. Pub. Health, Sendai City), no. 2:217-220. 1971.*

At main intersections in Sendai city, the determination of automobile exhaust gases and traffic volume was carried out. They were measured two times, 17:00 and 18:00 during the period of May 1st to July 17th. As a result, the mean value of traffic volume was higher than of Higashi-go-aobadori, Itsutsubashi, Kakyoin, Shiyakusho, Wakatake, Higashi-ichi-aobadori, Miyamachi, Daigakubyoin, Nagamachi, and Dainohara, in that order. The maximum 0value was 5520 at Higashi-aobadori, and the minimum value was 1476 at Dainohara. The carbon monoxide concentration was between 2.0 and 28.0 ppm, and it was recognized that the CO concentration was related to traffic volume and width of road of each point. The mean concentration was 8.9 ppm at 17:00, and 10.00 ppm at 18:00. Mean value was over the standard value of Preventive Regulations on Environmental Hazard (5.0 ppm) in Miyagi Prefecture.

20599 APTIC NO. 39064

Seki, Toshihiko, Hidehiko Hoshikawa, Morio Suzuki, and Tadashi Kanno

INVESTIGATION OF AIR POLLUTION BY AUTOMOBILE EXHAUST GASES ON THE STREETS IN SENDAI CITY. PART 3. *(Sendai shinai ni okeru jidosha haikigasu ni yoru gairojo no taiki osen chosa. (Dai 3 po)). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst. Pub. Health, Sendai City), no. 2:191-200. 1971.*

The investigation on the quality of the hazardous component caused by automobile exhaust gases and the determination of traffic volume was carried out. The measurement took place at Dainohara intersection (Sendai City) May 1, 1968, from 7:00 to 19:00. Traffic volume, the concentrations of carbon monoxide and nitrogen dioxide, amount of floating dust, noise, and atmospheric phenomena were measured. As a result, the total number was 16,866, the maximum was 1,638 at 18:00, and the minimum was 450 at 7:00. The maximum noise level was 88 phone, and 56 phone is the minimum. The mean level was 70 75 phone. The concentration of NO2 was 0.028 0.042 ppm (mean value 0.035 ppm). Floating dust was 1.02 mg/cu m during 7:00 10:00, 0.94 mg/cu m during 12:00 15:00, and 1.52 mg/cu m during 16:00 19:00. The concentration of CO was 0-20 ppm (mean value 8.1 ppm), 10 ppm during 8:00 11:00, 3.9 ppm during 12:00 - 15:00, and 10 ppm during 17:00 19:00. Though the traffic volume was decreased at 19:00, the concentration of CO was increased. It was considered that air diffusion was prevented by the lowering of temperature and rise of humidity.

20600 APTIC NO. 38964

Watanabe, Masaya and Yasuma Fukuchi

MAPS OF PUBLIC NUISANCE IN HOKKAIDO. *(Hokkaido kogai chizu). Text in Japanese. Kankyo Hakai (Environ. Destr.), 2(9):83-102, July 1971.*

Various categories of public nuisance in Hokkaido are reviewed by maps and tables. Air pollution problems are limited to large cities such as Muroran, Otaru, Tomakomai, Sapporo, Ebetsu, Iwamizawa, Yubari, Hakodate, Obihiro, and Kushiro. Cases of noxious odors, and water pollution are predominent throughout Hokkaido, but localized air pollution problems are quite serious. The large-scale air pollution situation is worsening in Sapporo due to combustion of petroleum fuels in factories and buildings. Data from one of five monitoring stations in the city indicate that the air failed to pass the national environmental air quality standard for sulfur dioxide. Serious air pollution and smog occur frequently during winter due to the heating systems of large buildings. Between November 1968 and March 1969, seven emergency warnings were issued. The average SO2 concentration of five winter months in Sapporo is 0.08 ppm. The carbon monoxide concentration in Yubari was the highest (12 ppm) in Hokkaido according to the 1969 investigation by the Hokkaido Pharmaceutical Association. Otaru is heavily polluted from factory stack gases and automotive exhaust gas. According to the summer 1969 investigation of the Hokkaido Hygienic Research Institute, the average carbon monoxide concentration based on a continuous 8-hour measurement was 25.6 ppm/hr, while the average of a continuous 24-hour measurement was 11.3 ppm/hr. The highest 1-hour measurement was 39.2 ppm, and the maximum single-moment figure reached 190.0 ppm. The 1970 records showed approximately the same figures. Muroran is the most polluted of Hokkaido cities and one of the most polluted areas in Japan. Steel industries are the main emission sources, and the SO2 concentration monitored at three locations perennially fail to achieve the environmental standard. Pollution from settling particles is heavy and the effects on human health are serious. The mortality of women older than 50 is extremely high due to respiratory diseases, and especially bronchial ailments. School swimming pools are not usable due to the quantity of settling particles and zinc plates on house roofs corrode in two or three years.

20601 APTIC NO. 39268

Weaver, Billy Don

DETAILED EMISSION INVENTORY FOR THE COMMONWEALTH OF PUERTO RICO. (FINAL REPORT). *Geomet, Inc., Rockville, Md., Environmental Management Program, Office of Air Programs Contract 68-02-0042, Geomet Rept. EF-59, 40p., Oct. 18, 1971. 3 refs.*

NTIS: PB 204382

A detailed commonwealth-wide emissions inventory of particulate, sulfur oxide, hydrocarbon, carbon monoxide, and nitrogen oxide sources of atmospheric pollution in Puerto Rico is presented. Specific point source data (e.g., power plants) and additional data on fuel usage, vehicular traffic, waste disposal, solvent evaporation, vessel traffic, aircraft activity, and sugar cane field burning as area sources were processed by computer. Total emissions in terms of tons/year are included for each municipality. Study area description, grid coordinate system, coding information, methodology, and survey results are presented.

ATMOSPHERIC INTERACTION

20602 APTIC NO. 38781

PURSUING PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu o ou). Text in Japanese. Kikaishi Nyushu (Govt. Mech. Lab. News), no.2:4-5, Feb. 1972.*

Using a smog chamber, studies were made on how temperature and humidity would affect the photochemical reaction in the atmosphere, on night smog, a phenomenon seen only at night, and on gas components causing oxidant. Propylene and ethylene, each an unsaturated hydrocarbon, were used in the experiment designed to examine possible effects of temperature and hunidity on the photochemical reaction. With propylene, the reaction became accelerated at 25 C or higher but remained constant from 25 C, indicating no effect of temperature, while the reaction became slower with higher humidity, producing less oxidant. With ethylene, the effect of temperature was clearly indicated; more oxidant formed with higher temperatures as in case of automotive exhaust gas. Formation of oxidant decreased with higher humidity. Behavior of the component gases following the photochemical reaction were studied. When the application of ultraviolet rays was stopped, the oxidants and nitrogen dioxide became extinct, while hydrocarbon and formaldehyde continued to exist for a long time as they were. These oxidants comprise such highly oxidating substances as ozone, peroxacetal nitrate (PAN), peroxybenzoyl nitrate (BBzB), peroxypropionyl nitrate (PPN), and peroxybutyl nitrate (PBN) differing in chemical characteristics, harmfulness to plants, and irritating effect to human eyes. Various kinds of hydrocarbons and nitric oxide were diluted in dry air and reacted to high-concentration ozone and then separated for examination by an infrared spectrophotometer and a mass spectrograph. It was possible to distinguish PAN from PPN by the peak wavelength, 8.6 micron for the former and 9.65 micron for the latter. In the mass spectrum, the peak values for PAN were 46, 30, 29, 43, and 15, implying ions of NO2, NO, methyl (CH3), and acetyl (CH3CO). Analysis by an electron-arresting gas chromatograph indicated that isobutene and propylene chiefly produce PAN while 1-butene causes PPN. A similar study was also made with paraffin and aromatics to find that the formation of PAN was extremely small. Others revealed that PBN was detected from n-butane and PBzN from toluene.

20603 APTIC NO. 39364

GLOBAL STUDIES OF THE ATMOSPHERE AND WEATHER FORECASTING. *(Globalnyye issledovaniya atmosfery i prognoz pogody). Text in Russian. Vestn. Akad. Nauk SSSR, no. 6:10-14, June 1971.*

The utilization of lasers for the quantitative evaluation of air pollutants generated by a wide variety of sources and for the establishing of atmospheric humidity profiles constitutes an important step in the development of weather forecasting. Further involvement of laser probing in meteorology will depend upon cooperation of diversified efforts such as quantic electronics, mathematics, and atmospheric optics. Satellites will provide further developments in atmospheric probing. The need for a deeper insight into the mechanism of solar radiation action upon the atmospheric dynamics is emphasized as another facet of considerable importance for the forecast theory. The leading research institutions involved in weather forecasting studies should be supplied with the most advanced computer equipment.

20604 APTIC NO. 39546

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare and Robert E. Forster

ATMOSPHERIC CARBON MONOXIDE. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 17, 1969. 2 refs.*

No significant increase in atmospheric carbon monoxide has been noted, although an increase in atmospheric carbon dioxide has been. The seas would dissolve only 3 times 10 to the 12th power g CO. Therefore, some chemical processes must be removing CO from the atmosphere at a rate comparable with its production by combustion –2.1 times 10 to the 14th power g/yr. A biologic or physical scavenger mechanism is of great interest and should be investigated, as should CO pools in sea water and in the atmosphere

20605 APTIC NO. 39595

TORONTO S AIR QUALITY MODEL: AFTER A YEAR A PROGRESS REPORT. *Water Pollution Control (Toronto), 110(4):80, 82, April 1972.*

The computerized air quality model for Toronto consists of three segments: the information system or memory bank, the wind field generation system, and the simulation model. The model keeps a daily track of pollution density of sulfur dioxide, particulates, nitrogen oxides, carbon monoxide, and hydrocarbons. If the concentration of any one one of the five pollutants rises near a danger point, the system signals this, and also points out the major sources emitting the particular pollutant in the greatest weight. This enables the Air Management Branch to notify the major offenders and demand a reduction in pollutant release. To develop the air model, metropolitan Toronto was first divided into about 650 grid squares. Pollution conditions were then measured in each square for about every type of weather and wind condition, and all of the conditions, including the weather and wind factors which accompanied them, were fed into the computer memory. Use of the model is considered.

20606 APTIC NO. 39045

Abraham, F. F., S. K. Jordan, R. N. Kortzeborn, and H. G. Kolsky

MODEL FOR TIME-DEPENDENT RAINDROP SIZE DISTRIBUTIONS: APPLICATION TO THE WASHOUT OF AIRBORNE CONTAMINANTS. *IBM J. Res. Develop., 16(2):91-100, March 1972. 31 refs.*

The rain washout process whereby small airborne particles are removed from the atmosphere and returned to the ground by precipitation was simulated by a time-dependent model. The model also included a spatially varying atmospheric profile and raindrop evaporation and coalescence as explicit parameters. The basic assumptions included an atmosphere constant in time and one-dimensional, i.e., the ambient temperature, pressure, and relative humidity were functions of altitude only; vertical and horizontal winds at zero; and raindrops falling vertically at their terminal velocities. Transient evaporation and coalescence are treated simultaneously; the size distrubition of drops is tracked as a function of time. The scavenging of airborne particles by the drops is inserted as the last step in the calculation. The time-dependent effects greatly altered washout at lower elevations. (Author summary modified)

20607 APTIC NO. 38836

Allen, E. R., R. D. McQuigg, and R. D. Cadle

THE PHOTOOXIDATION OF GASEOUS SULFUR DIOXIDE IN AIR. *Chemosphere, 1(1):25-32, Jan. 1972. 21 refs.*

The combustion of fossil fuels is a major source of air pollution by sulfur dioxide. Consequent atmospheric oxidation of SO2 to sulfuric acid aerosol and sulfate particles causes an increase in airborne particle loading. Feasible reaction mechanisms for the photooxidation of SO2 are reviewed. The photooxidation process is either solely responsible or insignificant in removing atmospheric SO2 depending on the quantum yield selected. Based on laboratory experiments, a reliable value for the quantum yield of photooxidation of SO2 in dry oxygen at 313 nm and in the emission band ranges 279-413 and 288-384 nm based on the rated of removal of SO2 was computed. Experiments were conducted over a range of initial pressure of SO2 and oxygen, as well as with added inert gases. The only product of reaction was sulfur trioxide. Combining the test results at 313 nm with the integrated specific absorption rate, a mean lifetime for SO2 in dry oxygen of 24 days or an averaged solar photooxidation rate of 0.35%/hr were determined. At the very most, therefore, the unsensitized process could account for 25% of the observed atmospheric conversion if the lifetime for SO2 is six days.

20608 APTIC NO. 39687

Amato, Amelio J.

A MATHEMATICAL ANALYSIS OF THE EFFECTS OF WIND ON REDISTRIBUTION OF SURFACE CONTAMINATION. *Atomic Energy Commission, Washington, D. C., Div. of Biology and Medicine, WASH-1187, UC-53, 7p., Sept. 1971. 4 refs.*

GPO: 483-023/102

A theoretical model was formulated to predict the long range, time and space, redistribution by wind of surface contamination. Creep, saltation, suspension, (followed by diffusion and deposition), and weathering are considered to effect a one dimensional flow pattern spatially described by an unlimited number of continouous intervals. Within each interval the contamination concentration is described as a function of time by a first order differential equation. Possible applications and extensions were discussed. The proposed model is highly flexible in that the analytic forms of the various transport mechanisms do not affect its basic structure. The functions representing the transport mechanisms may vary between intervals, reflecting the local geological and meteorological conditions. Experimental verification of proposed transport mechanisms and corresponding air concentrations might prove feasible.

20609 APTIC NO. 39133

Bach, Wilfrid

ATMOSPHERIC TURBIDITY AND AIR POLLUTION IN GREATER CINCINNATI. *Geograph. Rev., 61(4):573-594, 1971. 25 refs.*

A modified Volz sun photometer was used to record solar intensity at eight sites in the Cincinnati area to determine particulate pollution and atmospheric turbidity. The light scattering theory, variation of pollution with altitude, vertical fine structure of the lower atmosphere, diurnal variations in turbidity, temperature stratification, visibility, wind speed, spatial pollution variations, and the extent of the urban dust dome were also investigated. Equations were then constructed to calculate the number of particles for any height up to 200 m and for particle mass concentration, based on the assumption that airborne particles are spherical and nonabsorbing, that the mean particle diameter is 2 g/cu cm, that the scattering particles diameters range within 0.1-1.0 micron, and that turbidity coefficients vary exponentially with height.

20610 APTIC NO. 38725

Barr, Sumner

PREDICTION OF HIGH CONCENTRATIONS OF SHORT DURATION USING GROSS TURBULENCE STATISTICS. *J. Air Pollution Control Assoc., 22(4):275-277, April 1972. 3 refs.*

The use of traditional Gaussian models and semi-empirical turbulence relationships for the prediction and control of short duration air pollution maxima from a single source was investigated. The basic issues were the relative roles of low frequency wind direction meandering and high frequency turbulence fluctuations; and the use of source-site geometry to yield a specific solution to a diffusion problem. (Author summary modified)

20611 APTIC NO. 39102

Beal, Stuart K.

TURBULENT AGGLOMERATION OF SUSPENSIONS. *Aerosol Sci., 3(2):113-125, March 1972. 11 refs.*

Agglomeration of particles in turbulent flow can be competitive with deposition in its effect on the particle size distribution. In a typical situation, the agglomeration rate exceeds the deposition rate for particles smaller than 0.01 micron. The reverse is true for particles larger than 20 micron, and in the range of 0.1 to 1.0 micron the two rates are about equal. Comparison of theory and experiment shows poor agreement regarding the magnitude of the agglomerate rate/deposition rate relationship but fair agreement regarding the trend of the relationship with the Reynolds number, providing some indication that the theoretical concept is basically correct. An appendix discusses the calculation of diffusion coefficients. (Author abstract modified)

20612 APTIC NO. 39075

Becker, Karl H.

THE PHOTOCHEMISTRY OF AIR POLLUTION. *(Die Photochemie der Luftverschmutzung). Text in German. Umschau (Frankfurt), 72(8):255-256, April 1972. 2 refs.*

During combustion processes, nitric oxide is emitted into the atmosphere where it is slowly oxidized to nitrogen dioxide. Through solar radiation the NO_2 is split into NO and an oxygen molecule, the latter unites with the atmospheric oxygen forming ozone. Apart from ozone, formaldehyde, acetaldehyde, acrolein, organic peroxides, and peroxyacyl nitrate is formed from the emitted hydrocarbons. For a better understanding of the individual steps of the atmospheric reaction processes, they are being simulated in a spherical reaction vessel with a diameter of 7.5 mm. The velocity constants with which individual hydrocarbons react with ozone, how such reactions look like in presence of other pollutants, and which reaction products are formed are being studied. With the knowledge of all reaction parameters a mathematical model will be used for description of the photochemical processes in a polluted atmosphere.

20613 APTIC NO. 39111

Bergstrom, Robert W., Jr.

PREDICTIONS OF THE SPECTRAL ABSORPTION AND EXTINCTION COEFFICIENTS OF AN URBAN AIR POLLUTION AEROSOL MODEL. *Atmos. Environ., 6(4):247-258, April 1972. 54 refs.*

An urban air pollution aerosol model is developed for various chemical compositions and size distributions. Spectral absorption and extinction coefficients are predicted from the Mie theory for mixtures consisting of non-absorbing (quartz), absorbing (carbon), and metal-like (nickel) particles. The spectral optical thickness or turbidity of the atmosphere due to the aerosol is presented for an exponential vertical distribution. The effects of size distribution and chemical composition of the spectral absorption and extinction coefficients and discussed. Inclusion of carbon particles implies a wavelength independent spectral absorption coefficient for a haze L size distribution which is in agreement with experimental evidence. The effects of the metal-like particles are concluded to be negligible since they do not exist in large enough quantities in the urban atmosphere. Differences between using a wavelength constant mean index of refraction and materials whose indices of refraction are wavelength dependent are discussed. (Author abstract modified)

20614 APTIC NO. 38752

Bischof, Walter

CARBON DIOXIDE CONCENTRATION IN THE UPPER TROPOSPHERE AND LOWER STRATOSPHERE. II. *Tellus (Uppsala), 23(6):558-561, 1971. 7 refs.*

Carbon dioxide concentration in the upper troposphere and lower stratosphere was measured to study summer conditions. During May, the time of tropospheric CO_2 maximum, the CO_2 content in the lower stratosphere was about 4 ppm lower than in the upper troposphere. Based on measurements and radiosonde data in August, the CO_2 data changed rapidly with an increase in ozone and clearly demonstrated the vertical distribution at this time of year when CO_2 is removed from the atmosphere by plant activity, indicated by the decrease in CO_2 content. Deviations from the annual mean concentration in the interval 10-12 km were generally much larger than in the 8-10 km interval.

20615 APTIC NO. 39263

Borisenko, M. M.

DEPENDENCE OF VERTICAL WIND SPEED PROFILES ON THE TEMPERATURE GRADIENT. *(Zavisimost vertikalnykh profiley skorosti vetra ot temperaturnoy stratifikatsii). Text in Russian. Tr. Gl. Geofiz. Observ. Im. A. I. Voikova, no. 210:21-28, 1967. 12 refs.*

The dependence of wind speed profiles on temperature stratification is studied on the basis of measurements carried out at different altitudes and with different instruments at various points. For a more comprehensive study, a uniform method and uniform instrumentation would be necessary. The relationship between wind profile and vertical temperature gradient can usually be expressed by linear regression equations. Characteristics are given of wind profiles at different vertical temperature gradients. The error involved in the logarithmic description of profiles found in stable stratifications decreases with increasing stability To investigate the dependence of the wind profiles on the surface roughness during stable stratification, wind speed profiles were plotted in semilogarithmic coordinates and the mean square value of the error was determined. The result showed strong dependence on the orographic roughness, with low values in level areas. Mountains have agitating effects on wind profiles at great heights.

20616 APTIC NO. 39788

Bricard, J., M. Cabane, G. Madelaine, and D. Vigla

FORMATION AND PROPERTIES OF NEUTRAL ULTRAFINE PARTICLES AND SMALL IONS CONDITIONED BY GASEOUS IMPURITIES OF THE AIR. *J. Colloid Interface Sci., 39(1):42-58, April 1972. 26 refs.*

New experiments are described which furnish an explanation of the formation of particles deriving from the photolysis of the gaseous impurities of the air through the oxidation of sulfur dioxide, demonstrating the role of nitrogen dioxide in the process. The presence of NO2 provokes the oxidation of SO2 either directly following the reaction SO2 + O yielding sulfur trioxide or by the intermediary action of one or more substances which remain to be defined. The direct photooxidation of SO2 in concentrations comparable to those in which it is present in the atmosphere does not lead to an important aerosol formation. A new series of results concerning the spectra of mobility of ions formed in air by alpha particle disintegrations are also presented. The nucleation in the presence of a charge has as the effect, whatever the supersaturation of the water vapor, the creation of a stable state of which the molecular aspect corresponds to ions of the line spectral type.

20617 APTIC NO. 39785

Brock, J. R.

CONDENSATIONAL GROWTH OF ATMOSPHERIC AEROSOLS. *J. Colloid Interface Sci., 39(1):32-36, April 1972. 6 refs.*

Some aspects of the role of condensation in shaping the size distribution of atmospheric aerosols are examined. For the specific model investigated it is supposed that above some particle size (for the continental tropospheric aerosols taken to be greater than 0.1 micron) coagulation is not an important process. In this asymptotic size range, particles are continually supplied by condensational growth from a reservoir of particles which is itself supplied by nucleation, coagulation, and condensational growth from the small size range. Condensation- removal processes in this range produce characteristic particle size distributions. These characteristic distributions are highly skewed, long-tailed distributions which resemble experimentally observed distributions for the continental tropospheric aerosol. (Author summary modified)

20618 APTIC NO. 38980

Busch, George E. and Kent R. Wilson

TRIATOMIC PHOTOFRAGMENT SPECTRA. I. ENERGY PARTITIONING IN NO2 PHOTODISSOCIATION. *J. Chem. Phys., 56(7):3626-3638, April 1, 1972. 41 refs.*

The photofragment spectrum of nitrogen dioxide was measured in the near ultraviolet at 28 810 reciprocal cm. A molecular beam of NO2 is crossed with brief pulses of polarized laser light and measurements are made on the distributions of speed and direction of the recoiling oxygen and nitric oxide fragments produced by photodissociation. The average translational energy of the fragments is about 60% of the available energy. There are at least two prominent peaks in the translational energy distribution, and it is most likely that the two peaks correspond to nearly equal probability of recoil with the NO fragment in the v equal to 0 and v equal to 1 vibrational states. Such vibrationally excited NO fragments produced by photodissociation in polluted atmospheres could perhaps react with different rates than ground state fragments. The positions and widths of the peaks indicate that there is a significant rotational distribution. Statistical and direct models for photodissociation energy partitioning are briefly explored, and their predictions compared with the experimental measurements. A model is tentatively endorsed in which the nascent NO fragment is formed with vibrational excitation already present in the NO2 excited state. Dissociation is then assumed to occur quickly before statistical equilibrium is reached. (Author abstract modified)

20619 APTIC NO. 39025

Busch, George E. and Kent R. Wilson

TRIATOMIC PHOTOFRAGMENT SPECTRA. II. ANGULAR DISTRIBUTIONS FROM NO2 PHOTODISSOCIATION. *J. Chem. Phys., 56(7):3638-3654, April 1, 1972. 55 refs.*

The angular distribution of recoil of oxygen atoms from the photodissociation of nitrogen dioxide at 28 810 precriprocal is presented and analyzed to obtain information about the lifetime ans symmetry of the excited dissociative state. Theoretical effects on photofragment angular distributions of excited state symmetry, lifetime, angular momentum, and angular recoil distribution with respect to internal coordinates are considered. The actual angular distribution measured by photofragment spectroscopy, peaks in the direction of the electric vector of the light, indicating that the predominant upper state is of 2B-sub 2 symmetry. Some absorption leading to states of different symmetry cannot be excluded. An upper limit for the lifetime of the excited NO2 molecule before dissociation is approximately 2 times 10 to the minus 13th power sec, indicating that break-up to is too rapid to be affected by collisions in the atmosphere where NO2 photodissociation is an important step in photochemical air pollution. (Author abstract)

20620 APTIC NO. 39385

Carlson, Thomas A. and Manfred O. Krause

RELATIVE ABUNDANCES AND RECOIL ENERGIES OF FRAGMENT IONS FORMED FROM THE X-RAY PHOTOIONIZATION OF N2,02,CO, NO, CO2, AND CF4. *J. Chem. Phys., 56(7):3206-3209, April 1, 1972. 11 refs.*

A specially designed mass spectrometer was used to study the fragment ions following x-ray photoionization of several simple gaseous molecules, containing only first-row elements. The molecules included nitrogen, oxygen, carbon monoxide, nitric oxide, carbon dioxide, and carbon tetrafluoride. One photon source was primarily the CuL-sub alpha radiation generated by bombarding a copper anode with 6.0 keV electrons and filtering the x-rays through 400 micrograms/sq cm of aluminum; a second source utilized a carbon anode bombarded with 0.4 keV electrons and a filter made up of 60 micrograms/sq cm of polystrene. The higher energy x-ray source produced initial vacancies primarily in the K shells of the different elements, while the lower energy radiation produced ionization entirely in the valance shells. Data were obtained as a function of collection voltage, and relative abundances of the fragment ions were evaluated under conditions of equal collection efficiency. From the shape of the collection efficiency curve the average recoil energies were estimated. Results are briefly discussed in terms of the effect of the KLL Auger processes and multiple ionization. (Author abstract modified)

20621 APTIC NO. 38810

Cehelnik, Edwin, Chester W. Spicer, and Julian Heicklen

PHOTOLYSIS OF SULFUR DIOXIDE IN THE PRESENCE OF FOREIGN GASES. I. CARBON MONOXIDE AND PERFLUOROETHYLENE. *J. Am. Chem. Soc., 93(21):5371-5380, Oct. 20, 1971. 31 refs.*

Sulfur dioxide was photolyzed in the presence of carbon monoxide and perfluoroethylene at room temperature with 3130-A radiation. With CO the initial products were carbon dioxide and polymer. Carbonyl sulfide was produced as a secondary product. The CO2 quantum yield was independent of irradiation time, nearly independent of the absorbed intensity, and independent of SO2 pressure for SO2 pressures in excess of about 60 Torr. The CO2 quantum yield increased with increasing CO pressure and with decreasing SO2 pressure for CO2 pressures below 60 Torr. The addition of nitric oxide, biacetyl, or molecular oxygen inhibited product formation, but did not reduce it to zero. The addition of excess molecular nitrogen had no effect at large CO pressures, but reduced the CO2 quantum yield about 60% at low CO and SO2 pressures. With perfluoroethylene the products were carbonyl fluoride, c-C3F4, and polymer. The CF20 quantum yield was nearly constant at 0.05 for all runs with C2F4 pressures greater than 20 Torr. At low C2F4 pressures, the CF20 quantum yield fell as C2F4 was reduced or SO2 was increased from 2 to 75 Torr. At higher SO2 pressures, no change was observed. The c-C3F6 quantum yield was always less than the CF20 quantum yield but increased as the C2F4 pressure was raised. The addition of NO suppressed, but did not eliminate, product formation. The addition of excess N2 had no effect. Results are interpreted in terms of four electronically excited states of SO2, two singlet states, and two triplet states. A complete mechanism is proposed which is consistent with emission and other photochemical studies, and the relative rate constants are obtained. (Author abstract modified)

20622 APTIC NO. 39594

Changnon, Stanley A., Jr., Floyd A. Huff, and Richard G. Semonin

METROMEX: AN INVESTIGATION OF INADVERTENT WEATHER MODIFICATION. *Bull. Am. Meteorol. Soc., 52(10):958-967, Oct. 1971. 19 refs.*

METROMEX (METROpolitan Meteorological EXperiment), a field project designed and now in progress at St. Louis, involves four research groups planning and working cooperatively to study inadvertent weather modification by urban industrial effects, and, in particular, man-made changes of precipitation. Examination of historical data at St. Louis has revealed summer increases in the immediate downwind area of: rainfall (10-17%); moderate rainy days (11-23%); heavy rainstorms (80%); thunderstorms (21%); and hailstorms (30%). METROMEX field measurements in the summer of 1971 involved 220 raingages and hailpads, three radar sets, 70 rainwater collectors, 14 pibal stations, four meteorological aircraft, unique atmospheric tracers, and a wide variety of standard and unusual meteorological equipment. These measurement tools were used to provide information on the processes of cloud and precipitation formation, the chemistry of aerosols and rainwater, the urban heat budget, the 3-D patterns of precipitation elements, and the airflow and cloud development for numerical models. (Author abstract modified)

20623 APTIC NO. 39089

Davis, R. J.

A SIMPLE MODEL FOR THE ESTIMATION OF AEROSOL CONCENTRATION IN A CLOSED VESSEL. *Am. Ind. Hyg. Assoc. J., 32(9):603-609, Sept. 1971. 10 refs.*

A computer code was developed which calculated airborne concentration of an aerosol as a function of time. Particle generation, coagulation, and settling are the mechanism included. Simplicity is achieved largely by use of a postulated steady-state size distribution function. Calculated and observed concentration versus time are shown to agree quite well. A series of calculations of concentration versus time are presented to show the effects of various parameters. Since highly agglomerated aerosols are common among industrial particulate effluents, this calculation may well serve some purposes with regard to air pollution abatement as well as nuclear safety. (Author abstract modified)

20624 APTIC NO. 39534

Dennett, Joann Temple

OUR OVERBURDENED ATMOSPHERE. *NOAA (Nat. Oceanic Atmos. Admin.), 1(1):36-38, Jan. 1971.*

Comparison of atmospheric conductivity measurements made in 1967 with those taken early in the century revealed that conductivity over the North Atlantic is now at least 20% lower than it was during 1909-1929 and 40% lower than in the South Pacific. The decreased conductivity in the North Atlantic is a reflection of the increased aerosol pollution caused by the expansion of manmade pollution sources in the Northern Hemisphere. Since pollution may eventually cause a fundamental climatic change, there is a continuing need for long-term or secular measurements of environmental changes.

20625 APTIC NO. 39052

Devitofrancesco, Giuseppe, Francesco Panke, and Bianca Maria Petronio

THE BEHAVIOR OF SOME GASES AT THE ADSORPTION ON DUSTS. *(Ueber das Verhalten einiger Gase bei der Absorption auf Staeuben). Text in German. Staub, Reinhaltung Luft, 32(3):103-105, March 1972. 7 refs.*

The influence of various gases present in the atmosphere on the surface properties of respirable dust particles was evaluated by means of adsorption studies. The different heat of adsorption are related to the higher or lower degree of transformation of the surface and hence to the different toxicities. The studies were carried out with graphitized coal (60 to 80 mesh), clay dust (respirable grain size), and atmospheric aerosols collected by electrostatic precipitation. The test unit consisted of a line of glass tubes and teflon hoses which were furnished with glass capillaries for the maintenance of a constant current, a micro-heat conducting cell, and an integrator equipped with a potentiometric recorder. The differential adsorption heats were calculated from measurements of the pressure required for a certain adsorption on 1 g dust at various temperatures. The adsorption temperatures were 788 K and 90 K for carbon monoxide; 253 K and 265 K for nitric oxide, and 275 K and 284 K for sulfur dioxide. In the presence of NO, SO2, and CO the formation of secondary products was observed, while in the case of CO, this compound was only physically adsorbed.

20626 APTIC NO. 39586

Dmitriev, M. T. and N. A. Kitrossky

SOME PHYSICAL ANC CHEMICAL PROCESSES IN THE AIR CAUSED IN CONDITIONS OF ATMOSPHERE POLLUTIONS. *(Nekotoryye fiziko-khimicheskiye protessy v vozdudhe proiskhodyashchiye v usloviyakh zagryazneniy atmosfery). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Amosfery i Okeana, 8(1):103-107, Jan. 1972. 7 refs.*

Ozone and nitrogen oxide concentrations under different meteorological conditions of smog formation were studied in several cities of the USSR. Downtown Moscow had up to 400 micrograms/cu m of ozone during the summer months; this concentration was proportional to the nitrogen oxides and hydrocarbons found in the respective air samples. Average ozone levels were 2.5 times higher under sunny than under cloudy conditions. In southern cities, the ozone levels were twice the figures in Moscow under cloudy and 2.5 times as high under sunny conditions. Single ozone peak figures in Moscow exceeded, sometimes, related figures found in southern cities, which was attributed to the presence of larger exhaust amounts in the capital city air. The presence of nitrogen oxides in the polluted city air made ozone generation possible from radiation below 580 millimicron, this process was enhanced in the presence of radiation below 395 millimicron, opposed to clean air conditions where ozone formation occurs only from radiation below 253 millimicron wavelength. The simultaneous presence of hydrocarbons and nitrogen oxides led to ozone formation from radiation above 280 millimicron. Meteorological factors such as wind velocity, atmospheric temperature, atmospheric pressure, precipitation or temperature gradients affected the ozone levels in the usual way, known to be characteristic for common pollutants. Increased radiation intensity and decreased atmospheric humidity enhanced the ozone levels in comparison with other pollutants.

20627 APTIC NO. 39398

Dubarry, J. -J., J. Faivre, C. Tamarelle, and B. Dubarry

STUDY OF ATMOSPHERIC IONIZATION ON THE CANNES, BIARRITZ AND HOSSEGOR BEACHES AND IN THE HOSSEGOR FOREST. *(Etude de l ionisation atmospherique en bordure de mer a Cannes, Biarritz et Hossegor et dans la foret d Hossegor). Text in French. Bordeaux Med. (Bordeaux), 4(12):3715-3720, Dec. 1971. 9 refs.*

Results of comparative measurements of the atmospheric ionization on Cannes, Biarritz, and Hossegor beaches, and in the Hossegor forest are given. In Cannes, where winds from the continent were dominant, the atmospheric ionization was steadily negative. The effect of wind on the ionization curves obtained was evident. The same meteorological perturbations resulted in the same consequences regarding electric conductivity and ionization. Both negative ionization and conductivity increased during winds from the sea. On the beach of Biarritz, high conductivity and almost always positive, often elevated, ionization were observed. Both conductivity and ionization were increased by sudden changes in wind direction. The differences in the ionization on the Cannes and Biarritz beaches are due to differences in the climate. As opposed to the findings in Biarritz, simultaneous measurements in Hossegor forest revealed mostly negative and sometimes neutral ionization. At the same time, the ionization was predominantly positive with a few negative periods on Hossegor beach, at one km distance of the forest. The variations in the ionization were simultaneous but opposite to each other during 24h-periods.

20628 APTIC NO. 38794

Eichmeier, J. and W. Braun

MOBILITY SPECTRA OF ATMOSPHERIC IONS. *(Beweglichkeitsspektometrie atmosphaerischer Ionen). Text in German. Meteorol. Rdsch., 25(1):14-19, 1972. 9 refs.*

The mobility spectra of atmospheric ions at four sites in southern Bavaria were measured with two aspiration condensers. The spectra consisted of small-ion maxima at the mobility values k+ equals 1.46 (1.36) and k equals 1.83 (1.75) sq cm/Vs. With decreasing mobility, the spectral ion concentration goes through a minimum and then increases in the range of medium ion. The height of the small-ion maxima as compared with values in the medium ion range increases with decreasing air pollution. During fog and also Foehn (warm wind and spring storm conditions), the small-ion maxima are less expressed and the increase of the spectral curves in the medium-ion range is more rapid. During rain the small-ion maxima disappear.

20629 APTIC NO. 39593

Gambling, D. J. and K. Bartusek

LIDAR OBSERVATIONS OF TROPOSPHERIC AEROSOLS. *Atmos. Environ., 6(3):181-190, March 1972. 13 refs.*

Observations using a ruby laser radar or lidar have indicated the occurrence of three distinct types of optical turbidity profile in the troposphere over Adelaide, Australia, which are closely related to the prevailing meteorological conditions. Strong scattering was observed from a layer of aerosols associated with water vapor when the air mass originated from the Southern Ocean. These aerosols are believed to be hygroscopic. Weak scattering was generally observed when the air mass originated from the continent, except when the winds were exceptionally strong, or the air mass was humid. Strong scattering was observed in the visually clear region between cumulus clouds. Limitations in calculating tropospheric aerosol number densities from remote optical scattering observations are pointed out, as it is necessary to have an accurate knowledge of the aerosol size distribution and refractive index. (Author abstract modified)

20630 APTIC NO. 39100

Gay, Bruce W., Jr. and Joseph J. Bufalini

HYDROGEN PEROXIDE IN THE URBAN ATMOSPHERE. *Environ. Letters, 3(1):21-24, 1972. 4 refs.*

Hydrogen peroxide was quantitatively and qualitatively identified in the urban atmosphere. It was first suspected present in polluted atmospheres when it was found in a variety of systems studied in the laboratory. It was detected in irradiated systems containing oxides of nitrogen with such hydrocarbons as 1,3,5-trimethylbenzene, ethylene, propylene, and 1-butene. Irradiated auto exhaust also produced hydrogen peroxide. Field studies conducted at Hoboken, N. J., in July of 1970, indicated concentrations of hydrogen peroxide up to 4 pphm formed during moderate photochemical smog conditions. Hydrogen peroxide reached a maximum of 18 pphm during an episode of photochemical smog at Riverside, California. The reaction mechanism is discussed.

20631 APTIC NO. 39087

Gebhart, B. and L. Pera

THE NATURE OF VERTICAL NATURAL CONVECTION FLOWS RESULTING FROM THE COMBINED BUOYANCY EFFECTS OF THERMAL AND MASS DIFFUSION. *Intern. J. Heat Mass Transfer, 14(12):2025,2050, Dec. 1971. 22 refs.*

The laminar flows which arise in fluids due to the interaction of the force of gravity and density differences caused by the simultaneous diffusion of thermal energy and of chemical species are discussed. Species concentration levels are assumed small, as is typical for many processes in water and in atmospheric air. The usual Boussinesq approximations yield a set of equations which are shown to have solutions of similar form for combined buoyancy effects and for vertical flows adjacent to surfaces and in plumes. This similarity is of the same form as that found for single buoyancy mechanism flows. The resulting equations were integrated for air and water for various practical values of the Schmidt number and for multiple buoyancy effects aiding and opposing. The results show many interesting effects on velocity, heat, and mass transfer, and on laminar stability. A comparison of the results with those of integral method analysis shows the limits and reasons for failure of these approximate calculations in the more complicated of such combined buoyancy mechanism flow. (Author abstract modified)

20632 APTIC NO. 39411

Guillet, Remi

CONDITIONS OF APPEARANCE AND STATISTICAL PREDICTION OF THE FORMATION OF WATER MIST AT THE EXIT OF CHIMNEYS. *(Conditions d apparition et prevision statistique de formation de brouillard de vapeur d eau a l emission les cheminees). Text in French. Chim. Ind. Genie Chim., 104(7):872-878, April 1971. 10 refs.*

Investigation of the atmospheric condensation of water vapor contained in fumes required the formulation of various hypotheses on mass and heat transfer processes near chimneys. Equations are given for such processes and for the calculation of dew point temperatures. A biunivocal relationship was found between dew point temperature Tr and the concentration of combustion products at any point around the chimney. The criterion for condensation to occur is T-Tr is less than or equal to zero, and can thus be studied as a function of the concentration in combustion products and of the temperature. Application of the method is shown. With the combustible known, the prediction of the atmospheric condensation at a given moment of the water contained in fumes requires knowledge of the state of the ambient air, of the state of the combustion products at the moment of ejection from the chimney, and of the total pressure of the fumes. Statistical evaluation of the risk of condensation is possible if meteorolgic

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parameters for the site are known. The present method does not permit determination of the coordinates of water mist formation.

20633 APTIC NO. 39672

Hanna, Steven R.

METEOROLOGICAL EFFECTS OF COOLING TOWER PLUMES. *Preprint, National Oceanic and Atmospheric Administration, Oak Rige, Tenn., Air Resources Atmospheric Turbulence and Diffusion Lab., 27p., 1971. 5 refs. (Presented at the Cooling Tower Institute, Winter Meeting, Houston, Tex., Jan. 25, 1971.)*

The amounts of energy and moisture emitted to the atmosphere by cooling towers were compared to the production of energy and moisture by meteorological processes. The energy input from a large (1000 MW) power plant is a significant fraction of the energy production of mesoscale atmospheric phenomena such as thunderstorms. Methods for calculating the rise of cooling tower plumes and the possibility of cloud formation due to these plumes are described. The height of rise of a moist plume can be approximately estimated using simple formulas, but the depth and amount of cloud cannot be easily estimated. (Author abstract modified)

20634 APTIC NO. 38907

Hawkins, Harry F., Karl R. Kurfis, Billy M. Lewis, and H. Gote Ostlund

SUCCESSFUL TEST OF AN AIRBORNE GAS CHROMATOGRAPH. *J. Appl. Meteorol., 11(1):221-226, Feb. 1972. 6 refs.*

A portable gas chromatograph designed for real-time studies in diffusion was successfully tested in an airborne application. A 10-mi low-level plume of colorless, odorless non-toxic sulfur hexafluoride was laid down over northwest Andros Island, Commonwealth of Bahama Islands, by a C-130 aircraft. An accompanying DC-6 carrying the analyzer made 81 in-flight samples over a period of less than 3 hr. The chromatograph has a sensitivity limit of 0.03 ppb and completes the analysis for SF6 less than 2 min after the sample is injected into the column. Of the more than 80 in-flight chromatographs, 11 indicated positive identification of the inert tracer gas. (Author abstract modified)

20635 APTIC NO. 39216

Hogan, Austin W.

EXPERIMENTS WITH AITKEN COUNTERS IN MARITIME ATMOSPHERE. *J. Rech. Atmospheriques, 3(1-2):53-57, 1968. 6 refs.*

A portable nucleus counter and a continuous nuclei counter were used to observe Aitken nuclei over the North Atlantic Ocean between latitude 30 and 40 N, along the northwest coast of Europe, and off the eastern coast of the United States. All observation stations were 10-20 m above the water line. The performance and reliability of the instruments were excellent. Results show that continental influence can be seen in aerosol 500 mi off shore and that in some cases, over unpopulated terrain, a maritime aerosol can be detected with very little modification 40 mi inshore.

20636 APTIC NO. 39210

Hogstrom, Ulf

PREDICTING ODOR FREQUENCIES BY DISPERSION CALCULATIONS. *Preprint, Environmental Protection Agency, Washington, D. C., 9p., 1971. 7 refs. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Methods for predicting odor frequencies through dispersion modeling are reviewed. The absolute odor threshold dispersion model is outlined as a basis for more advanced treatments. When the sampling time is of the order of one hour, the plume geometry is relatively simple: the plume rises as a consequence of buoyancy but levels off after a distance, thus obtaining an almost horizontal mean axis. The distribution of the pollutants in the plume is nearly Gaussian. The standard deviation is a function of stability and wind speed, also depending on the plume height and roughness of the ground. Plume geometry for a shorter time is also considered. Model situations for ground level concentration predications under given meteorologic conditions and model modifications are presented. Comparision of predicted odor frequencies with actual field observations gives a striking degree of correlation.

20637 APTIC NO. 39636

Jehn, Kenneth H.

SOME ASPECTS OF ENGINEERING METEOROLOGY. *Sci. Mon., 76(1):3-9, Jan. 1953. 32 refs.*

Beyond a study of the physical basis of meteorology is the highly pragmatic consideration of the impact of the atmospheric environment upon living things, including man, and upon man-made structures. These effects dictate the need for a consideration of meteorologic factors in the solution of various engineering problems. During World War II, the application of meteorologic knowledge and techniques to military and naval operations achieved a high degree of success. The design or planning aspects of meteorology or climatology in engineering problems and the forecasting aspect are considered. Engineers are often required to solve problems involving the release of industrial wastes to the atmosphere. The engineering problem arises when the rate of dispersion or dilution is insufficient to prevent excessive local concentrations. A consideration of architectural problems from the weather point of view introduces the concept of local climate, or microclimate; significant variations of the microclimate occur over relatively short horizontal and vertical distances. Some research and training aspects of engineering meteorology are discussed.

20638 APTIC NO. 39484

Koch, Robert C. and Scott D. Thayer

VALIDATION AND SENSITIVITY ANALYSIS OF THE GAUSSIAN PLUME MULTIPLE-SOURCE URBAN DIFFUSION MODEL. (FINAL REPORT). *GEOMET, Inc., Rockville, Md., Environmental Protection Agency Contract CPA-70-94, GEOMET Rept. EF-60, 312p., Nov. 1971. 65 refs.*

NTIS: PB 206951

The analysis and results of a program of validation and sensitivity analysis of the steady-state Gaussian plume type of urban diffusion model were presented. The fundamental short-term steady-state model and its various modes of implementation were developed in terms of emission and environmental input parameters and in terms of calculational modes. A set of computer programs developed especially for validation and sensitivity study purposes was described. The validation study consists of a variety of comparisons of short-term and long-term concentration predictions from the model, with comparable measured sulfur dioxide concentrations covering three months of two-hour values at ten locations in St. Louis, and one month of one-hour values at eight locations in Chicago. The predictions use hourly estimates of meteorological and emission parameters. Individual short-term model results show large deviations from the observed concentrations over a month or a season compare quite well with the comparable frequency distribution of observed concentrations. No single factor could be found which accounts for a significant fraction of the individual deviations. Predicted long-term concentrations show consistently good agreement with observations, as contrasted with the significant overestimation usually found in other model implementations. A technique was proposed for calculating the long-term estimates which obviates the need to calculate the short-term concentration in the period. A sampling process is used in which a statistically selected set of as few as five to ten percent of the short-term periods is employed, and the representativeness of the distribution is maintained. In the sensitivity analysis, the insensitivity of the model concentrations to the parameters of wind speed profile parameter value, and the distribution of area source emission heights, was demonstrated. (Author summary modified)

20639 APTIC NO. 38760

Kooser, Eugene K.

METHODS OF TREATING ATMOSPHERIC CONDITIONS. *(World Weather Inc., Houston, Tex.) U. S. Pat. 3,608,810. 4p., Sept. 28, 1971. 7 refs. (Appl. Dec. 5, 1968, 9 claims).*

Conventional methods of increasing rain, suppressing hail, and dispersing fog, such as by dispensing salt in the atmosphere have been entirely unpredictable and thus do not provide the dependability desired when treating conditions that can cause disastrous results, to man, crops and/or structures. Part of the reason for the lack of success of prior art methods of treating atmospheric conditions is that the conditions sought to be controlled were not fully understood. In the present method, the atmosphere is treated with surfactants to decrease surface tension and cause water droplets to coalesce. Atmospheric conditions are treated with water soluble polyelectrolytes to remove charges on water droplets to permit coalescence. Fog is dispersed by dispensing fog coalescent materials at a weak or unstable point in a fog bank and working toward the area to be cleaned.

20640 APTIC NO. 38763

Kooser, Eugene K.

TREATMENT OF ATMOSPHERIC CONDITIONS BY INTERMITTENT DISPENSION OF MATERIALS THEREIN. *(Assignee not given.) U. S. Pat. 3,608,820. 4p., Sept. 28, 1971. 8 refs. (Appl. Dec. 5, 1968, 7 claims).*

Prior methods of increasing rain, suppressing hail, and dispersing fog, such as by dispensing salt, have been unpredictable and thus have not provided the dependability desired for treatment of these conditions. A method is described to treat fog by dispersing therein materials for causing coalescence of water droplets at spaced locations to form pockets of instability. Surfactants or water soluble polyelectrolytes are the materials to be dispersed in the fog. The present method is useful in increasing rainfall, suppressing hail, and dispersing fog.

20641 APTIC NO. 39273

Mammarella, L.

THE RELATIONSHIP BETWEEN URBAN MICROCLIMATE AND URBAN AIR POLLUTION. *(Rapporti fra micrometeorologia cittadina ed inquinamento atmosferico urbano). Text in Italian. Consiglio Nazionale delle Ricerche, Rome (Italy), Inst. di Fisica dell Atmosfera, Rept. IFA-TR 34, 25p., Dec. 1970. 42 refs.*

Microclimate and topography can cause the dispersion of a potentially high level of pollution, but they can also accumulate a high concentration pollutants. Just as microclimate can influence pollution, so can pollution influence the microclimate. An urban environment differs from a rural environment by a profound alteration of the earth s surface by streets and structures and by a continuous effusion of aerosols, gases, and vapors. Urban microclimatic factors differing from those of non-urban zones include insolation, the number of condensation nuclei, air currents, visibility, nebulosity, precipitation, temperature, and relative humidity. Urban insolation is 15-20% less than rural insolation due to scattering of light by aerosols and due to the absorption of ultraviolet light by gaseous pollutants and nitrogen oxides. A high number of condensation nuclei contributes to fog formation, to conversation of heat in the lower atmosphere, and to an increase of relative humidity. Air movement in cities is reduced by 20-25% in comparison with rural areas principally because of temperature factors. A characterization of urban pollution must include meterological data (temperature, wind, velocity, relative humidity at ground level and at 10, 20, 40, 60 and 100 m above ground), a list of pollutants, levels of pollutants, diffusion studies by means of trace elements, mathematical diffusion modelling, and the relatinship between emissions and fuel consumption.

20642 APTIC NO. 39538

Matveyev, A. A. and O. I. Bashmakova

CHEMICAL COMPOSITION OF ATMOSPHERIC PRECIPITATION IN SOME REGIONS OF THE USSR. *Sov. Hydrology Selected Papers, no. 5:480-491, 1967. 35 refs. (Also: Gidrokhim. Materialy, vol. 42:3-16, 1967.)*

Compiled maps of the average annual mineral composition of precipitation, chemical composition, and the precipitation of salts with atmospheric precipitation per unit area, give an idea with an accuracy of plus or minus 15-45% of these values for various regions of the USSR. Mineral composition of precipitation in the USSR varies respectively from 10 mg/l to 5 tons/sq km in the northern and northwestern regions to 60 mg/l to 50 tons/sq km in the southeast. The concentration of marine salts varies from 60% in the north to 15% in the central part of the country of the total mineral composition in the precipitation. The influence of continental factors is greatest in the regions south of 50 deg N. The following ions were measured: chloride, sodium, sulfate, bicarbonate, calcium, magnesium, and potassium. (Author conclusions modified)

20643 APTIC NO. 39779

McCloskey, John W., James K. Luers, John P. Ryan, and Nicholas A. Engler

STATISTICAL ANALYSIS OF LO-LOCAT TURBULENCE DATA FOR USE IN THE DEVELOPMENT OF REVISED GUST CRITERIA. *Dayton Univ., Ohio, Research Inst., Air Force Flight Dynamics Lab. Contract F33615-69-C-1477, AFFDL-TR-71-29, 137 p., April 1971. 9 refs.*

NTIS: AD 731139

Low-level critical atmospheric turbulence (LO-LOCAT) is an extensive low level turbulence program utilizing statistically representative samples of turbulence data obtained over a wide range of meteorological, topographical, seasonal, and time of day conditions. The various meteorological and environmental conditions which affect the turbulence as reflected through a number of turbulence parameters are identified. The turbulence parameters considered were: the standard deviation of the gust velocity, the turbulence intensity, the scale of turbulence, and the characteristic frequency. The basic method of mathematical analysis was a stepwise regression scheme which related the environmental conditions to the various turbulence parameters based upon statistical priority. The regression scheme provides a detailed outline of statistical relationships which can be used as a guide for further investigation. (Author abstract modified)

20644 APTIC NO. 39438

McElroy, James L.

A NUMERICAL MODEL OF THE NOCTURNAL URBAN BOUNDARY LAYER. *Preprint, Office of Air Programs, Research Triangle Park, N. C., Div. of Meteorology, 8p., 1971. 15 refs.*

A nocturnal urban bounbary layer model was used to simulate the thermal structure of the layer over Columbus, Ohio. Experimental data included vertical profiles of temperature and moisture and ground level temperature measurements. Information on the aerodynamic surface roughness, surface relative humidity, artificial heat flux, and sub-surface thermal properties was specified at horizontal distance intervals of 1 km. Numerical simulations were made for the near steady-state period just before sunrise, with data extending to 300-400 m above ground. A constant value of 15 m was used for the layer thickness. During experiments, the depth of the layer seldom exceeded 100 m. Numerical simulations and actual data were then compared. The observed and simulated depths were in good agreement. The model may be used to estimate the effects of alternate land-use strategies on the nocturnal urban thermal structure and thus on the relative atmospheric dispersive ability.

20645 APTIC NO. 38904

Medeiros, Robert W.

SMOG FORMATION SIMPLIFIED. *(Chemistry), 45(1):16-18, Jan. 1972. 4 refs.*

Prerequisites for smog formation include plenty of sunshine, temperature inversions, and automobile exhaust emissions. High temperatures inside the engines of automobiles and other motor vehicles cause a reaction between atmospheric oxygen and nitrogen to form nitric oxide. At the same time, varying amounts of fuel in the piston chambers fail to burn completely, causing a mixture of olefins, aldehydes, and ketones to be expelled from the exhaust and crankcase. In addition, gasoline is discharged to the atmosphere by simple evaporation from the gas tank and carburetor. These organic molecules are then excited by ultra violet radiation from the sun. They translate their energy to ordinary atmospheric oxygen to produce highly reactive singlet oxygen which then reacts with nitric oxide to produce nitrogen dioxide and atomic oxygen. The atomic oxygen may react with atmospheric oxygen to produce ozone or it may combine with a second molecule of nitric oxide to form nitrogen dioxide. Both ozone and nitrogen are highly irritating and toxic, and they also react with some of the organic substances from incomplete combustion to form compounds such as peroxyacetyl nitrate, a powerful lachrimator believed to be the principal source of discomfort from smog. Plant damage and materials deterioration due to smog are mentioned. Afterburners are indicated for the control of automobile emissions.

20646 APTIC NO. 38818

Mizoguchi, Isao, Yasuhito Sato, Masanobu Osawa, Kuniyoshi Makino, and Hiroshi Yagyu

CORRELATION OF OXIDANTS CONCENTRATIONS WITH OTHER AIR POLLUTANTS AND METEOROLOGICAL FACTORS IN TOKYO. (1ST REPORT). *(Okishidanto to hoka no taikiosenbusshitsu oyobi kishoyoso tono sokansei ni tsuite. (Dai 1 po)). Text in Japanese. Tokyo-toritsu Eisei Kenkyusho Kenkyu Nenpo (Annu. Rept. Tokyo-to Lab. Med. Sci.), no. 22:207-212, 1970. 3 refs.*

Studies were made on the transition of oxidant concentrations and the correlation between oxidant concentrations and other air pollutant concentrations and meteorological factors on the basis of the data from March 1967 to March 1971 measured by the National Air Sampling Network of Tokyo. The annual average of oxidant concentrations showed a gradual rise throughout the 5 yrs reaching 0.04 ppm. Average oxidant concentrations during spring and summer were higher than those during autumn and winter. A temporary rise at night was noted in winter, whereas during summer, high concentrations were limited to daytime. Correlations between oxidant concentrations and other air pollutants including meteorological factors during the day and night were studied based on the data obtained from two cases of photochemical smog with high concentration of oxidant. Correlation between high oxidant concentrations and wind velocity in the daytime was significantly negative and the correlation to temperature was significantly positive. During 5 days in July 1970 when oxidant concentrations were consecutively above 0.1 ppm, the correlation coefficient between oxidant concentrations and carbon monoxide concentrations was significantly positive.

20647 APTIC NO. 39485

Montgomery, Thomas L., S. B. Carpenter, William C. Colbaugh, and Fred W. Thomas

FULL-SCALE STUDY OF PLUME RISE AT LARGE ELECTRIC GENERATING STATIONS. BULL RUN SUPPLEMENT. *Tennessee Valley Authority, Muscle Shoals, Ala., Div. of Environmental Research and Development, 65p., Oct. 1971. 10 refs.*

NTIS: PB 206821

A practical, data-based procedure for estimating effective plume rise versus distance was developed. The results of an investigation are presented of the relationships of the meteorological, plant design, and operating conditions to the initial plume rise within 152 m from the source, rate of plume rise with downwind distance, and distance where the maximum rise occurs. More than 1100 photographs were used in the evaluation, incorporating special photometric methods. The rate of plume rise with downwind distance depends on the atmospheric stability, with the effective rise depending on the initial rise within about 150 m from the source. This initial rise is a function of stack design, emission parameters, and mean wind speed between stack top and plume top. Stack height affects the effective plume rise only because of the possibility of releasing the stack effluent into different meteorological regimes since the meteorological parameters are defined from stack top to plume top. Results of the evaluation indicate that for a known stability range, an expression may be determined for estimating the effective plume rise at various distances from the stack. Equations for estimating plume rise under neutral, stable, and very stable conditions were given. (Author summary modified)

20648 APTIC NO. 39771

Moses, Harry E.

THE MOTION OF TRAILS THROUGH FLUIDS WITH CONSTANT VELOCITY SHEAR. *Air Force Cambridge Research Labs., Bedford, Mass., Aeronomy Lab., Proj. 7635-13-01, Rept. AFCRL-71-0412, ERP-367, DOD Element 62101F, DOD Subelement 681300, 13p., July 30, 1971. 3 refs.*

NTIS: AD 731172

The motion of smoke trails in winds of constant shear was studied theoretically. The general case is examined where the velocity field has a constant shear in space and time and has a term which is proportional to time. Special cases of flow are discussed in which the shear corresponds to potential flow (flow without vorticity); flow in which vorticity predominates; and flow in which there is stratification of the velocity field.

20649 APTIC NO. 39459

Niemann, Brand L., Margaret C. Day, and Paul B. MacCready, Jr.

PARTICULATE EMISSIONS, PLUME RISE, AND DIFFUSION FROM A TALL STACK. VOLUME 1. TECHNICAL REPORT. (FINAL REPORT). *Meteorology Research, Inc., Altadena, Calif., National Air Pollution Control Administration Contract CPA-22-69-20, MR169 FR-890, 134p., Jan. 1970. 28 refs.*

NTIS: PB 204990

As part of a study of diffusion from a 245-meter power plant stack in complex terrain, turbulence intensity within and outside the plume was measured with a Universal Indicated Turbulence System, and the concentration and size distribution of particles in the plume were measured with a Moving Slide Impactor. In addition to these airborne measurements, a ground camera sequentially photographed the plumes from the side. Project data are summarized and evaluated, sample data are given, and digital computer data reduction techniques are described. Particulate measurement results were ambiguous; environmental variability obscured superimposed plume characteristics. A scanning electron beam microscope gave the most definitive results. Use of the UITS to derive vertical exchange coefficients to explain the vertical transport of the plume in its final stages of development, to estimate surface shear and roughness, and to monitor and explain the decay of the turbulence in the initial plume seems valid but needs further verification. Particle collection with the MSI and analyses of plume height and characteristics by 35-millimeter slides from a single camera were also effective techniques. Comparison of aircraft and photogrammetric data on plume rise with standard prediction methods showed that plume rise followed a power law with an exponent somewhat less than the 0.67 often suggested. Observations were fitted to a ground concentration prediction equation and the resulting predictions of sulfur dioxide concentration at the ground were compared with observations; results are evaluated.

20650 APTIC NO. 39416

Oden, Svante

THE ACIDIFICATION OF AIR AND PRECIPITATION AND ITS CONSEQUENCES ON THE NATURAL ENVIRONMENT. *(Nederbordens och luftens forsurning - dess orsaker, forlopp och verkan i oilka miljoer). Swedish Natural Science Research Council, Stockholm, Ecology Ecological Research Committee, Bull. 1, May 28, 1968. Translated from Swedish. Translation Consultants, Inc., Arlington, Va., 117p.*

Measurements were taken of the chemical composition of the air and of precipitation throughout Europe. Concentration in the atmosphere and precipitation analyses of sodium, potassium, calcium, magnesium, chlorine, ammonium, and sulfates were determined. The acidification of precipitation, specifically with respect to increased concentrations of sulfur as well as saltpeter and salt acid, was tested and correlated with known meteorological and climatic conditions. Causes of the acidification are examined. The effects of acidification on lakes and rivers, soil and vegetation, fisheries, materials, and buildings, biological conditions in forestry and agriculture, and the economic results of acidification are reviewed. Data on the acidity of yearly precipitation in Europe, various pH values, and trends and areal distributions for the values are included.

20651 APTIC NO. 39483

Pandolfo, Joseph P., Marshall A. Atwater, and Gerald E. Anderson

PREDICTION BY NUMERICAL MODELS OF TRANSPORT AND DIFFUSION IN AN URBAN BOUNDARY LAYER. *Center for the Environment and Man, Inc. Hartford, Conn., National Air Pollution Control Administration Contract CPA-70-62, CEM Contract 4082, 139p., July 1971. 37 refs.*

NTIS: PB 206939

A three-dimensional model based on the Eulerian conservation equations for momentum, heat, water vapor, salinity, and air pollutants was used to examine the transport and diffusion processes in the planetary boundary layer. Horizontal diffusion was incorporated through a strongly and implicitly diffusive finite-difference scheme for the horizontal advection terms. Terms representing other transport and diffusion processes were explicitly included in the differential equations. It is feasible to simulate the temporal variation of meteorological and pollutant variables, on a three-dimensional array containing several thousand grid points, within practical limits, on a computer. Simulated urban-rural low level temperature differences in winter are qualitatively realistic. The depth of the mixing level and the strength and height of the mixing level are dependent on the simulated interface temperature. The simulated daytime vertical profile of pollutants shows a well-mixed surface layer with quasi-constant concentrations. The nighttime profile shows definite peaks of concentration near the source height. The presence of reasonable concentrations of transparent pollutants reduces the amplitude of the diurnal temperature wave at the interface by 2 K and may alter the air temperature within the polluted layer by about 2 K. Differences in low level pollutant concentration of about 25% are noted between simulations with transparent and nontransparent pollutants. Three-dimensional fields of meteorological and pollutant variables were simulated using Connecticut source inventory data and typical winter meteorological conditions. These simulations show systematic patterns of higher temperatures and deeper polluted layers over the urban areas than over rural areas. They also show systematic patterns of low level convergence of the horizontal flow over urban areas. (Author abstract modified)

20652 APTIC NO. 39225

Pivovarova, Z. I.

THE LONG-TERM VARIATION OF INTENSITY OF SOLAR RADIATION ACCORDING TO OBSERVATIONS OF ACTINOMETRIC STATIONS. *Tr. Gl. Geofiz. Observ. (Leningrad), no. 233:17-37, 1968. 54 refs. Translated from Russian by T. C. Marwick. 31p.*

The long-term variation of mean annual intensity of direct solar radiation measured at eight geophysical observatories in the USSR and four pyrheliometer observatories in the northeastern United States are analyzed. The change with time of maximum radiation was also investigated. This parameter corresponds to great transparency of the atmosphere, i.e., favorable conditions for the passage of solar radiation through the atmosphere. In addition to a tendency towards a decrease in radiation measured at all the stations, the variations in specific years are in agreement. The transparency of the atmosphere and the solar radiation associated with it observed at the surface of the earth decrease from north to south in conformity with increasing moisture content and dustiness of the atmosphere towards southern latitudes.

20653 APTIC NO. 38959

Randhawa, Jagir S.

OZONE MEASUREMENTS NEAR SUNRISE. *Nature Phys. Sci., 233(40):101-102, Oct 4, 1971. 5 refs.*

Sunrise ozone concentrations at 46 km altitude were measured by a recently-developed ozonesonde employing chemiluminescence which was modified to include a constant-volume sampling pump and which, together with temperature, pressure, and density sensors was launched in a balloon from White Sands Missile Range, N. Mex. The ozone concentration was constant when the balloon was floating 45-46 km and started decreasing approximately 1 min before solar radiation was actually incident on the balloon. As the solar radiation hit the balloon, a one-third drop in ozone concentration occurred in approximately 50 sec. The large decrease is attributed to the increased rate of water vapor desorption from the balloon at sunrise.

20654 APTIC NO. 38961

Rank, D. H. and J. P. McKelvey

ATMOSPHERIC POLLUTION. *Phys. Today, 24(8):11, 13, Aug. 1971. 4 refs.*

Objections are raised to the quantitative estimates and methods of detection being used in a current research project, as reported in the article, Astra Project Monitors Atmospheric Pollution (Physics Today/Jan. 1971). Since the telluric lines due to atmospheric pollutants lie in the infrared region of the spectrum beyond the region of photography, the suggestion that old observatory plates might provide information on atmospheric pollutants and trends is criticized. The concept that a large telescope and spectrograph should be set up in a city to monitor pollution using high-temperature stars as background sources is rejected. On the question of carbon dioxide balance, while it is true that the burning of as much as 10 to the 9th power tons of carbon per year would cause an increase of 3.6 ppm CO2 in the atmosphere and in ten years 36 ppm or 12%, this calculation ignores the fact that the CO2 in sea water is in equilibrium with the CO2 in the atmosphere.

20655 APTIC NO. 38962

Raschke, Ehrhard

MULTIPLE SCATTERING CALCULATION OF THE TRANSFER OF SOLAR RADIATION IN AN ATMOSPHERE-OCEAN SYSTEM. *Beitr. Physik Atmosphaere, vol. 45:1-19, 1972. 28 refs.*

The transfer of solar radiation in the spectral inverval between 0.325 and 0.95 micron was calculated using a two-layer model of the ocean-atmosphere system and taking into account the multiple anisotropical scattering by aerosols and hydrosols and the anisotropical reflection and transmission of a rough water surface. Several results, such as angular distributions of upward and downward radiances and irradiances at different levels of the system, are discussed. Upward radiation in the atmosphere is largely determined by reflection properties of the ground, transfer properties of the atmosphere, zenith angle of the sun, and to a lesser degree by transfer parameters of ocean water. In the ocean downward total radiance shows decreasing influence of direct solar radiation and of the forward scattered sky radiation on the total radiance with increasing depth. At 30 deg N latitude and a sun declination of 23 deg, direct solar radiation between 0.325-0.95 micron heats the subsurface layers of the ocean; at depths greater than about 15 m, diffuse radiation becomes an important illuminating and heating source. These conclusions are in qualitative agreement with several experimental observations.

20656 APTIC NO. 39661

Sarjant, R. J.

STEELMAKING PROCESSES IN RELATION TO ATMOSPHERIC POLLUTION. *Iron Steel (London), vol. 32:185-190, May 1959. 27 refs. (Presented at the British Steel Castings Research Association, Harrogate Conference, Oct. 24, 1958.)*

The effects of atmospheric pollution arising from steelmaking processes are reviewed. The data relating to pollution indicate that the particle size range is from over 100 to 0.01 micron and is predominantly iron oxide. Mathematical formulae should enable the designer to decide whether chimney height and gas temperature are high enough to disperse the gases adequately. The fine particle size is favorable for the dispersal of solid pollutants. Dedusting is a function of particle size and the effective height of emission. Use of mathematical formulae is possible predict to the rate of deposit to be expected from given conditions of emission. Downdraught emissions from chimneys can be avoided by choice of chimney height. Attention is directed to the avoidance of downwash by controlling the discharge velocity from the chimney. Atmospheric stability also influences pollutant dispersal. (Author conclusions modified)

20657 APTIC NO. 39032

Sehmel, G. A.

PARTICLE DIFFUSIVITIES AND DEPOSITION VELOCITIES OVER A HORIZONTAL SMOOTH SURFACE. *J. Colloid Interface Sci., 37(4):891-906, Dec. 1971. 28 refs.*

Particle effective eddy diffusion coefficients were calculated from experimental deposition fluxes to a smooth horizontal surface. The coefficients were a function of both particle inertia, the distance from the surface, and the air friction velocity which is contained in both dimensionless terms and were greater than the particle effective eddy diffusion coefficients for particle deposition along a vertical surface. Both correlations determined that the coefficients were much greater than the eddy diffusion of air momentum for distances from the surface less than 20. For greater distances, particle concentration profiles at a distance of 1 cm were used to calculate particle effective eddy diffusion coefficients for distances from a surface of 200-900. The effective eddy diffusivities were combined with Brownian diffusion and gravity settling to predict particle deposition velocities for particle sizes within 0.01-100 micron diameter for particle densities of 1 and 10 g/cu cm. Each of these mechanisms of particle transport controls the predicted deposition in some range of particle size. Deposition velocity minima were 0.00018-0.0077 cm/sec for particle sizes within 0.066-0.54 micron. The minima and deposition velocities were equal to or much greater than predicted from gravitational settling. (Author abstract modified)

20658 APTIC NO. 39579

Shabad, L. M., Y. L. Cohan, A. P. Ilnitsky, A. Ya. Khesina, N. P. Shcherbak, and G. A. Smirnov

THE CARCINOGENIC HYDROCARBON BENZO(A)PYRENE IN THE SOIL. *J. Nat. Cancer Inst., 47(6):1179-1191, Dec. 1971. 41 refs.*

The content, distribution, and fate of benzo(a)pyrene in the soil of various USSR regions were investigated. A high content of the carcinogenic hydrocarbon was measured in the soil of an oil refinery; benzene extracts from this soil caused skin cancer in treated mice. The concentrations of benzo(a)pyrene were greater in the old areas of the large cities than in the newer areas and in urban sections as compared with rural sections. The background level was 1-3 micrograms/kg and did not exceed 10 micrograms/kg. The main source of soil contamination was its sedimentation from the air, particularly from aircraft exhausts. Content decreased with distance from source, but was spread within 3-5 km from the source. The redistribution of benzo(a)pyrene across soil layers and its migration into plants were studied. Seasonal variations of soil content are considered. The content eventually decreases and, at the doses applied, attains background values within a year. The main factor of benzo(a)pyrene destruction is the activity of soil bacteria. (Author summary modified)

20659 APTIC NO. 39568

Shaw, R. W.

THE ATMOSPHERIC ENVIRONMENT SERVICE AND AIR POLLUTION METEOROLOGY. *Weatherwise, 24(6):280-283, Dec. 1971. 15 refs.*

The activities of Atmospheric Environment Service (AES) in air pollution meteorology in Canada are discussed. Sulfur dioxide is a major pollution problem. Industrial cities have many sources of pollutants such as factories and electric generating plants. Air pollution potential forecasting, concentrations of the pollution and knowledge of pollution on a regional scale, and other meteorological factors are discussed. Investigations of ventilation, which indicates how well the atmosphere transports pollution horizontally and dilutes it vertically, is especially important for the Arctic where future industrial expansion is expected. On a global scale, studies of pollution transport, rainout, washout, turbulence effects, and land use will contribute to controlling air pollution.

20660 APTIC NO. 39127

Shieh, L. J., P. K. Halpern, B. A. Clemens, H. H. Wang, and F. F. Abraham

AIR QUALITY DIFFUSION MODEL: APPLICATION TO NEW YORK CITY. *IBM J. Res. Develop., 16(2):162-170, March 1972. 17 refs.*

An experimental multisource air pollution diffusion model based on the Gaussian plume formulation was examined by application to experimental air quality measurements. The model incorporates point and area sources, time and space dependence of source strengths, and time and space dependence of meteorological variables, including observations of wind speed and direction with a spatial density of observation points dependent on local geography and the observed concentration field and atmospheric stability classes based on the vertical thermal stratification. Numerical simulations of the sulfur

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dioxide concentration distribution for New York City agreed favorably with field measurements on a time scale of about 2 hr. (Author abstract modified)

20661 APTIC NO. 38730

Shiozawa, Kiyoshige, Atsushi Ootakik, and Shinichi Okamoto.

STUDIES ON THE PREDICTION OF AIR POLLUTANTS CONCENTRATION (II) -- RELATIONSHIP BETWEEN POLLUTANTS CONCENTRATION AND METEOROLOGICAL FACTORS. *(Taiki osen busshitsu nodo no yosoku ni kansuru kisoteki kenkyu (II) -- osen nodo to kisho yoso no kankei). Text in Japanese. Waseda Daigaku Rikogaku Kenkyusho hokoku (Bull. Sci. Eng. Res. Lab., Waseda Univ.), no. 54:60-72, 1971. 4 refs.*

The quantitative relationship between air pollution and meteorology was investigated in the Tokyo area of Japan. The pollution index was closely related to air pressure, vapor pressure, relative humidity, cloudiness, precipitation, visibility, season, dew point temperature, and wind direction. The canonical correlation coefficients were 0.84 during the winter and 0.92 during the spring. Incidents of heavy air pollution concentrations were closely related to the south wind direction, because the pollutants were not diffused and additional pollutants came into the area from the Keihun and Keiyo industrial districts. Based on canonical variates corresponding to canonical correlation coefficients, air pollution and air pressure patterns around the Japanese islands were closely related.

20662 APTIC NO. 39352

Shir, C. -C.

NUMERICAL INVESTIGATION OF THE ATMOSPHERIC DISPERSION OF STACK EFFLUENTS. *IBM J. Res. Develop., 16(2):171-179, March 1972. 12 refs. (Includes appendix by W. E. Langlois.)*

Pollutant concentration distributions downwind from a stack were calculated via a diffusion model based on the gradient-transfer theory and including the vertical inhomogeneity of the atmosphere and ground roughness as model parameters. Vertical wind and temperature profiles were calculated numerically from given values of ground roughness, wind speed, and relative temperature at stack height. The equation governing plume behavior from the stack was solved by a finite difference method. The numerical results suggested that ground roughness is an important parameter whose differing values may cause disagreements between different sets of experimental data. Wind effect was small under neutral conditions. The effective mean wind decreased to a minimum value a short distance from the stack and then increased downwind. (Author abstract modified)

20663 APTIC NO. 38957

Sidebottom, H. W., K. Otsuka, A. Horowitz, J. G. Calvert, B. R. Rabe, and E. K. Damon

VIBRONIC EFFECTS IN THE DECAY OF THE FLUORESCENCE EXCITED IN SO2 AND NO2. *Chem. Phys. Letters (Amsterdam), 13(4):337-343, March 15, 1972. 25 refs.*

The intensity of fluorescence of the first excited singlet sulfur dioxide molecule shows an unexpected non-exponential decay when observed over several lifetimes. This is found for both broad band, xenon-flash excitation at 2660 plus or minus 100 and 2860 plus or minus 160 A and for laser excitation at 2662 plus or minus 1 A. The decay is exponential when either long wavelength, broad-band excitation is employed (2980 plus or minus 140 A) or at long observation times using any excitation wavelength. All of the data are most consistent with the hypothesis of one emitting singlet state whose rate constants are somewhat dependent on its degree of vibrational excitation. A kinetic treatment of the data gives the zero pressure lifetime and the quenching rate constants for the vibrationally rich (22.7 kcal/mole) and the vibrationally relaxed excited singlet states. These and other quantum yield data suggest that the observed decrease in the lifetime of the singlet SO2 state which accompanies vibrational relaxation is associated with a significant increase in the rate of some ill-defined, non-radiative decay process for these conditions. Emission data from the spectroscopically analogous compound nitrogen dioxide, excited at 4365, 532[illegible], and 6943 A, also show non-exponential decay. In this case, however, the lifetimes at zero pressure show no significant variation with alteration in the degree of vibrational excitation of the NO (2B-sub 1) state. (Author abstract)

20664 APTIC NO. 39223

Siskin, N. S.

ON THE (ELECTRICAL) CHARGING OF CLOUD DROPLETS AND FOG DROPLETS BY DIFFUSION. *Dokl. Akad. Nauk. SSSR, vol. 176:1288-1291, 1967. 6 refs. Translated from Russian by P. A. J. Graham. 6p.*

Electrical charging of cloud droplets and fog droplets by diffusion is investigated, and possible mechanisms are cited to explain the experimental data. Atmospheric ions approaching the surface of a droplet by virtue of diffusion give up their charge principally to the neutral molecules of water on the surface of the layer. When a neutral molecule of water is converted to a positive ion the double layer prevents the migration of the ion into the interior of the liquid. The determination of the concentration of atmospheric ions in an equilibrium state is calculated.

20665 APTIC NO. 39448

Soo, S. L.

DIFFUSION AND FALLOUT OF PARTICULATES EMITTED BY AIRCRAFT ENGINES. *Preprint, American Society of Mechanical Engineers, New York, 12p., 1971. 21 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D.C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Av-2.)*

Aircraft contribute an increasing fraction of total community emission of pollutants. For given engines and fuels, the effect of pollutants around an airport can be reduced through operating procedures that consider the nature of diffusion and fallout of pollutants, including particulates, during the idle, taxi, take-off, land, approach, and cruise modes of flight. Data and relations for the path of the plume in these flight modes can be determined from those for stacks, including the effects of crosswind, buoyancy, and density gradient in the atmosphere. Diffusion and fallout are correlated as a moving source problem, and the effect of wing-tip vortices, plume visibility and monitoring, and simulation and modeling are discussed. For accurate recording, evaluation, and prediction of pollution by aircraft, emission data should include emission index, parametric with rated thrust. Adequate information is already available to conduct a computer modeling of flight operation at an existing or planned airport. The formulations presented are applicable to study of the distribution of other pollutant species in an urban environment.

20666 APTIC NO. 39612

Spencer, W. F.

DISTRIBUTION OF PESTICIDES BETWEEN SOIL, WATER AND AIR. *Michigan State Univ., East Lansing, Pestic. Soil: Ecol. Degradation Movement, Int. Symp. East Lansing, Mich., 1970, p. 120-128. 32 refs. (Feb. 25-27.)*

Understanding of factors affecting the partitioning of pesticides between soil, water, and air is necessary to adequately predict the behavior and fate of pesticide in soils. Henry's Law describes partitioning between water and air; partitioning between soil and water is governed by sorption and solution equilibria which depend on the soil, the chemical, and their interactions with water. Partitioning of a pesticide between the three phases can be estimated from either vapor-phase or solution-phase desorption isotherms. Vapor densities of soil-applied organic chlorine insecticides indicate that volatilization is a major pathway for loss of even relatively non-volatile pesticides. Soil-water content effects on volatilization are due to an increased vapor density resulting from displacement of the pesticide from the soil surfaces by water and not due to evaporation of water by codistillation. Volatilization becomes a diffusion controlled process as the pesticide concentration at the surface of the soil is depleted. The rate of diffusion, as well as the proportion of the total diffusion in the vapor phase, is dependent on soil water content and other factors that influence the partitioning. (Author summary modified)

20667 APTIC NO. 39203

Stoenescu, S. M. and M. Dragusia

SOME CONSIDERATIONS REFERRING TO THE TENDENCY FOR VARIATION OF AIR TEMPERATURE AS AN EFFECT OF THE DEGREE OF URBANISATION OF BUCHAREST. *Meteorol. Hidrol. Gospod. Apelor, vol. 13:659-664, 1968. 2 refs. Translated from Rumanian by J. Grindley. 6p.*

With population growth and increased industrial activity, there has been a systematic reduction in the transparency of the atmosphere in Bucharest because of the large concentrations of opaque suspended particulates. At the end of the last century, the annual duration of bright sunshine exceeded 2300 hr, while in the first decades of the 20th century the duration had fallen to 2200 2100 hr. Average monthly air temperatures in Bucharest show a systematic increase. Temperatures in the urban center, at the northern periphery of the city, and in a rural area are compared.

20668 APTIC NO. 39557

Strand, Otto Neall

OPTIMIZATION OF FREQUENCIES USED IN INDIRECT SENSING BY INVERSION. *National Oceanic and Atmospheric Administration, Boulder, Colo., Environmental Research Labs, NOAA-TR-ERL-203-WPL-14, 22p., March 1971. 11 refs.*

An expression for the expected mean-square error in the statistical estimation of tropospheric temperature profiles by the inversion of microwave thermal emission measurements was derived to determine a semi-probabilistic computer search technique the frequencies that minimize the expected mean-square error for a given (small) number of microwave frequencies. A specific problem for Denver, Colo. is solved, but the method can be applied to any situation involving optimum linear estimation of the solution of a Fredhoxm integral equation of the first kind with specified a priori mean and covariance data on the unknown function. (Author abstract modified)

20669 APTIC NO. 39422

Tribus, Louis L.

ODORS AND THEIR TRAVEL HABITS. *Trans. ASCE (Am. Soc. Civil Engrs.), 85(1486):378-429, 1922. 3 refs. (Presented at the American Society of Civil Engineers, Nov. 16, 1921.)*

Odors from garbage treatment and sewage disposal works, food processing and ore and oil refining are discussed. Examples of odor dispersal and litigation are given, and the distances odors travel and the atmospheric conditions under which they specifically become obnoxoius are briefly considered. Differences in odor perception and tolerance diurnal effects, are also discussed.

20670 APTIC NO. 39194

Vassy, A. T.

THE FORMATION OF OZONE BY ELECTRICAL DISCHARGES IN THE ATMOSPHERE: EXPERIMENTAL RESULTS AND THE GENERAL ASPECTS. *Air Force Cambridge Research Center, Cambridge, Mass., Geophysics Research Directorate, Threshold Space, Proc. Conf. Chem. Aeron., Cambridge, Mass., 1956, p. 73-77. 8 refs. (June 25-28.)*

Continuous measurements of ground-level ozone concentrations and lightning discharges have been made near Paris since 1953 and 1954, respectively. A study of the records showed that in summer months (April-September) the percentage of thunderstorms accompanied by an increase in ozone is as high as 78%. In winter months (October-March), the percentage is only 58%. The mean time elapsing between the first electrical discharges and the increase in ozone concentrations is almost 5 hr in winter and 3 hr in summer. Since the duration of increased ozone concentration is shorter in summer, the quantities of ozone produced during thunderstorms are nearly the same in summer and winter. The formation of ozone in thunderstorms appears to be a result of electrical action inside the thunderstorm cell, and not a direct result of lightning. A laboratory study of this problem revealed that lightning produces more nitrogen oxides than ozone.

20671 APTIC NO. 39458

Vaughan, Leland M. and William A. Perkins

THE WASHOUT OF AEROSOL PARTICLES AND GASES BY RAIN. *Stanford Univ., Calif., Aerosol Lab., Contract DA-48-007-403-CML 448, TR-88, 43p., Jan. 1961.*

Available theoretical and experimental information on the removal of aerosol particles and gases from the atmosphere by natural and simulated rainfall was examined, and calculation procedures were developed for estimating washout loss for 1-5 micron particles and water-soluble gases. For practical purposes, the loss of 1-5 micron particles of unit density depends on the total precipitation falling through the aerosol regardless of rainfall intensity. Computed loss is critically dependent on particle size and is small for particles of less than 3 micron, but may be significant for particles greater than 3 micron. For 25 mm of rain, the computed washout of 3-5 micron particles is 10, 78, and 98%, respectively. If the particles are nonwettable, the computed washout loss is zero even for extremely heavy rainfall. If the gas is extremely soluble and the rate of absorption controls washout loss, the total loss will depend on both rainfall intensity and duration. Thus 85% will be removed in 5 hr at 1 mm/hr and 65% in 1 hr at 5 mm/hr. If a gas has a finite solubility, the total loss depends on total rainfall, the equilibrium concentration ratio of the gas in water and in air, the ambient concentration, and exposure time. (Author summary modified)

20672 APTIC NO. 39599

Weinstock, Bernard and Hiromi Niki

CARBON MONOXIDE BALANCE IN NATURE. *Science, 176(4032):290-292, April 21, 1972. 27 refs.*

Consideration of the steady-state equations for stable carbon monoxide and for radioactive carbon monoxide in the troposphere leads to the conclusion that CO is produced at a rate of 5 times 10 to the 15th power g/yr, a value 25 times greater than the rate of CO production from combustion. The concomitant residence time for CO is 0.1 year. Hydroxyl radicals account for both the production of this large amount of CO by methane oxidation and for its removal by CO oxidation. The average concentration of hydroxyl radicals in the troposphere required to achieve this effect is 230,000 molecules/cu cm, with a daytime concentration of twice that. Others have deduced concentrations of hydroxyl radicals in the troposphere of the same magnitude from purely photochemical considerations, in support of this model. (Author abstract modified)

20673 APTIC NO. 39021

White, Kenneth O., Stuart A. Schleusener, E. Howard Holt, and Robert F. Calfee

HIGH-RESOLUTION-LASER ATMOSPHERIC-TRANSMISSION-MEASUREMENT METHOD. *Appl. Phys. Letters, 19(10):381-382, Nov. 15, 1971. 13 refs.*

A new method of measuring the wavelength dependence of the absorption losses in atmospheric gases of solid state laser radiation is described. The method depends upon the use of a wavelength selecting gate to identity laser spikes within a narrow wavelength range and the use of such spikes for the compilation of transmisssion data. Experimental results of erbium-laser propagation losses in carbon dioxide with a spectral resolution of 0.015 nm are compared with a theoretical calculation. (Author abstract)

20674 APTIC NO. 39138

Yokoyama, Osayuki

AN EXPERIMENTAL STUDY ON THE STRUCTURE OF TURBULENCE IN THE LOWEST 500 METERS OF THE ATMOSPHERE AND DIFFUSION IN IT. *Kogai Shigen Kenkyusho Hokoku (Rept. Pub. Nuisance Resources Res. Inst.), no. 2:1-118, March 1971. 79 refs.*

The atmospheric turbulence in the layer up to 500 m high was measured by a bi-directional vane mounted on a captive balloon and by a sonic anemometer thermometer (SAT) attached to a high broadcasting tower. Observation by the bi-directional vane was carried out at Higashi Mikawa in Aichi Prefecture (Nov. 1967), Ukima in Tokyo (March and Dec. 1968), and Kinuura in Aichi Prefecture (Aug. 1968). The SAT was installed on the broadcasting tower at Kawaguchi city in Saitama Prefecture and three dimensional wind speed and fluctuation of temperature were measured from March 1968 to July 1969. For obtaining the statistical quantities, such as variances, covariances, and spectra of turbulence, data were converted into digital form by A-D converter, and analyzed by computer. The R.M.S. of the vertical fluctuating speed, was proportional to the friction velocity measured at the same height and obtained by the co variance method. The effects of stability on the vertical fluctuating speed were represented by KEYPS equation but for the other layer, the local value of momentum and heat fluxes obtained by co-variance method should be used. The relation between vertical fluctuations and wind speed was different for the lower and higher part of the atmospheric boundary layer: in the layer height below 150 m it was proportinal to the wind speed; in the layer above 200 m, it was proportional to the magnitude of velocity defect. The R.M.S. of lateral and longitudinal speeds, were proportional to the vertical fluctuating speed. The scale of vertical fluctuations increased linearly with height in the layer below 150 m, but above this level the increase of the scale with height seemed to become small.

BASIC SCIENCE AND TECHNOLOGY

20675 APTIC NO. 38772

Annis, B. K., A. P. Malinauskas, and E. A. Mason

THEORY OF DRAG ON NEUTRAL CR CHARGED SPHERICAL AEROSOL PARTICLES. *Aerosol Sci., vol. 3:55-64, Feb. 1972. 32 refs.*

An expression for the pressure dependence of the drag exerted on a spherical aerosol particle by a flowing gas is derived by dividing the problem into two parts, one which is concerned with viscous effects, and another which is concerned with diffusion effects. The latter part is treated in terms of classical kinetic theory by assuming the aerosol to be mathematically equivalent to a binary gas mixture. The resulting expression yields results which are in good agreement with the data of Millikan and the accurate numerical results obtained by Cercignani and co-workers through the use of the Bhatnager-Gross- Krook model. The main virtues of the kinetic theory model are its simplicity, consistency, and particularly its extendability, so that it can also be applied to more complicated phenomena like thermophoresis and diffusiophoresis. (Author abstract modified)

20676 APTIC NO. 39420

Artem ev, A. V.

ALLOWED REGIONS OF MOTION OF CHARGED PARTICLES NEAR THE EARTH. *Sol. Syst. Res. (English translation from Russian of: Asuron. Vestn.), 4(2):94-99, April-June 1970. 11 refs.*

An energy intergral in a rotating coordinate system is used to derive the surface of zero relative velocity which restricts the motion of charged dust particles in the magnetic field of the gravitational dipole. The properties of these surfaces are examined, as are their changes resulting from transformation to different coordinate systems. Dynamic equilibrium solutions are found. The classical approximation is used. (Author abstract modified)

20677 APTIC NO. 39394

Azzopardi, M. and Y. Pauleau

OXIDATION OF COPPER WITH NITROGEN MONOXIDE. *(Oxydation du cuivre par le monooxyde d azote). Text in French. Bull. Soc. Chim., France, 5(2):507-509, 1972. 15 refs.*

The oxidation of copper with nitric oxide in a temperature range of 500-750 C and above was studied. Within the range from 500 to 750 C, the oxidation of copper was a linear function of time, and was limited by an external semi-reaction, yielding cuprous oxide. The reaction rate was practically independent of the pressure of the NO. The hypothesis on the dimerization of NO was proved. At temperatures above 750 C, where Cu20 was the only solid product, the oxidation was very irregular due to the formation of blisters.

20678 APTIC NO. 39727

Barat, P., C. F. Cullis, and R. T. Pollard

STUDIES OF THE COMBUSTION OF BRANCHED-CHAIN HYDROCARBONS. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 179-193. 19 refs. (Aug. 23-29.)*

The cool-flame oxidation of both 3-ethylpentane and 3-methylpentane was studied in the temperature range 250-410 C. The results show that with these two brached-chain hydrocarbons, the principal chain-propagating cycle involves alkylperoxy radical isomerization, followed by decomposition of the resulting hydroperoxyalkyl radicals. Evidence is presented for the first time that ethyl group shifts can occur during the breakdown of the latter radicals. The alkene-hydroperoxy radical addition route appears to play only a minor role, even at 403 C. It is also shown that the higher the octane number of a hydrocarbon fuel the more likely it is to lead to beta-scission products. Since many of these products are lower molecular weight alkenes, this result is very relevant to the problem of pollution from vehicle exhausts, since alkenes may react photochemically to form smog. (Author abstract)

20679 APTIC NO. 39723

Bauer, S. H., P. Jeffers, Assa Lifshitz, and B. P. Yadava

REACTION BETWEEN CO AND SO2 AT ELEVATED TEMPERATURES: A SHOCK- TUBE INVESTIGATION. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 417-425, 12 refs. (Aug. 23-29.)*

The oxidation of carbon monoxide by sulfur dioxide was studied in a single-pulse shock tube over the temperature range 1770-2453 K. The reactant composition were CO/SO2/Ar equals 1/1/98, 4/4/92, 1/4/95, and 4/1/95, with initial reactant driver (helium) pressure ranges of 27-170 torr and 50-174 psi, respectively. Reflected-shock dwell times lasted 375-541 microsec. Gas chromatographic and mass spectrometric analyses of the shocked samples indicated that no 02, SO3, or S2O was produced and only traces of COS and CS2 were generated. Close to two moles of CO2, the principal product, was formed per mole of SO2 which disappeared. At the small conversions tested, precise stoichiometry could not be established, and the CO concentrations were not directly measured. Although no quantitative check on the presence of solid sulfur could be obtained, there were several qualitative indications of sulfur deposition on the shock-tube walls and on the column packing. An empirical rate expression was obtained. Three plausible mechanisms are considered; one, a vibrational excitation process, is favored. (Author abstract modified)

20680 APTIC NO. 38714

Cadle, R. D., San San Lin, and R. F. Hausman, Jr.

THE REACTION OF O(3P) WITH PROPIONALDEHYDE AND ACROLEIN IN A FAST-FLOW SYSTEM. *Chemosphere, 1(1):15-20, Jan. 1972. 11 refs.*

The reaction of atomic oxygen 0(3P) with propionaldehyde and with acrolein was investigated in a fast-flow system. Total pressure was within 0.5-3.2 torr for propionaldehyde reactions and 1.7-3.5 torr for acrolein reactions. Concentrations of the reactants were varied, and the effect of temperature was investigated over the range 300-480 K. The chromatograms for the partially reacted propionaldehyde had two peaks, corresponding to ethane and propionaldehyde. Three peaks were determined for acrolein, corresponding in retention time to acetylene, ethylene, and unreacted acrolein. Carbon monoxide and carbon dioxide were also produced. The reaction orders were essentially one in each reactant. The rates were independent of pressure over the range investigated. Relative yields and rate constants were calculated. Reaction mechanisms and kinetics are discussed.

20681 APTIC NO. 39148

Dahler, John S. and Won-Hoon Park

THERMOMAGNETIC TORQUE FOR NITRIC OXIDE. *J. Chem. Phys., 56(8):4190-4191, April 15, 1972. 8 refs.*

The theory of the thermomagnetic torque due to Levi, McCourt, and Beenakker was used to assess the relative magnitudes and field dependences of the torque contributions due to the second derivative dyad of temperature and to thermal creep. In the case of nitric oxide, the latter was responsible for approximately 25-50% of the total torque. (Author abstract modified)

20682 APTIC NO. 38974

Datta, A. K

CLASSICAL DISTRIBUTIONS OF CHARGED DUST. *Indian J. Phys., 44(5):278-282, May 1970. 9 refs.*

Formulae for comparing data on charged dust distributions obtained from Newtonian theory with data obtained from general relativity theory were derived by coupling classical hydrodynamic equations for pressureless charged dust and Maxwell equations. A formula is included for the charge density in terms of the electric and magnetic field vectors and the acceleration and vorticity of the dust. In the absence of a magnetic field, the vorticity and electric field are orthogonal. If the magnetic field vanishes, the electric flux through any element of area bounded by dust particles is a constant of motion.

20683 APTIC NO. 39342

Davidson, J. A. and E. W. Abrahamson

THE SO2 PHOTOSENSITIZED PRODUCTION OF 02(1 SIGMA G+). *Photochem. Photobiol., 15(4):403-405, April 1972. 24 refs.*

The gas phase photosensitized production of singlet molecular oxygen as a result of the energy transfer from excited organic molecules was studied for the particular determination of sulfur dioxide as a sensitizer to effect the production of singlet molecular oxygen when irradiated in the presence of 02. In order to obtain a measure of the efficiency of the energy transfer process in the SO2-02 system, the initial intensity of singlet molecular oxygen emission at 762 nm was studied. The 02 and SO2 pressures ranged within 4.3-109.6 and 1.3-17.3 torr, respectively. The ratio of the rate of phosphorescence quenching of SO2(3B1) by SO2 to the rate of quenching of SO2(3B1) by 02 was calculated as 5.6 + or 1.1. In spite of the relatively low quantum yield of energy transfer in the system, SO2 is still at least as important a source of singlet molecular oxygen in the atmosphere as polynuclear aromatic compounds.

20684 APTIC NO. 38966

Davis, E. G. and M. L. Rooney

TRANSPORT OF SULPHUR DIOXIDE IN POLYMERS. *Kolloid Z. Z. Polym., 249(1/2):1043-1050, Nov./Dec. 1971. 26 refs.*

Studies were made of the permeation, solution, and diffusion of sulfur dioxide in polyethylene, polyamide (Nylon 11), and polycarbonate at 25 C and pressures up to 1 atm. The steady-state permeability coefficients of SO2 in all three polymers were pressure-dependent, and the effect of pressure on the solution and diffusion processes, which together govern the overall permeation processes, account for the observed relations. Solution and diffusion in the two glassy polymers, polyamide and polycarbonate, were strongly pressure-dependent; in the case of polyethylene diffusion was pressure-dependent but solution obeyed the Henry law. The vapor pressure isotherms of the glassy polymers obeyed a modified Langmuir expression suggesting that two concurrent sorption mechanisms were operative, the filling of microvoids within the polymer structures and ordinary Henry law solution. Kinetic sorption-desorption studies showed that diffusion was Fickian in polyethylene and polyamide over the entire pressure range. It was also Fickian in polycarbonate at pressures up to about 25 cm Hg but non-Fickian at higher levels. For each polymer, diffusion coefficients were determined by steady-state permeation and transient sorption desorption methods, and the separate methods gave similar values. The results should have applications to SO2 pollution research and control and to polymer packing of foods containing SO2. (Author summary modified)

20685 APTIC NO. 39713

Downer, A. W. E.

THE PRESERVATION OF CITRUS JUICES WITH SULPHUROUS ACID. *J. Soc. Chem. Ind., vol. 62:124-127, Aug. 1943. 10 refs.*

Sulfited concentrated citrus juices contain a lower proportion of free sulfurous acid than unconcentrated juices, due to the proportionally higher concentration of sulfurous acid-fixing substances, presumably chiefly glucose, in the concentrates. Factors affecting the free sulfurous acid content of juices and glucose solutions were investigated. Fermentation appears to be more frequent among concentrated juices than among unconcentrated juices. Since it appears that free sulfurous acid exerts a preserving effect, it is suggested that the lower free sulfurous acid content of concentrated juices contribute largely to the higher incidence of fermentation among them. Fermentation would probably be less frequent if concentrated juices contain more sulfurous acid. (Author abstract)

20686 APTIC NO. 39629

Eller, Charles and William H. Beckert

NITROGEN DIOXIDE FIXATION IN BACTERIAL CHROMATIN STUDIES. *J. Bacteriol., 90(6):1710-1712, Dec. 1965. 13 refs.*

Satisfactory chromatin staining was obtained with two bacillus species when nitrogen dioxide was used for fixation in conjunction with either the acid Giemsa or Feulgen staining methods. An impression method was employed for the transfer of bacilli to a new environment as well as for smear. Fixation with nitrogen dioxide is much less toxic, cheaper, and requires only seconds of exposure, when compared to other methods. The same nitric acid can be used repeatedly, as long as the added copper wire produces vapors. (Author abstract modified)

20687 APTIC NO. 39360

Fung, B. M.

MOLECULAR ORBITALS AND AIR POLLUTION. *J. Chem. Educ., 49(1):26-27, Jan. 1972. 6 refs.*

The introduction of at least one example of molecular orbital symmetry for chemical reactions would be a welcome addition to undergraduate physical chemistry. Both the reaction of nitric oxide to yield nitrogen plus oxygen and the reaction of 2NO plus 02 to yield nitrogen dioxide are exothermic and thermodynamically allowed. Although the first reaction is more favorable, it is very slow; had it been the predominant reaction, we would have much less smog and air pollution. On the other hand, the second reaction is quite fast, especially in the presence of ultraviolet light and certain unsaturated hydrocarbons. Since NO is a major component of automobile exhaust, the second reaction is largely responsible for the formation of smog in cities. The difference in the rates of these reactions is qualitatively explained by molecular orbital symmetry.

20688 APTIC NO. 38827

Good, William D.

ENTHALPIES OF COMBUSTION OF 18 ORGANIC SULFUR COMPOUNDS RELATED TO PETROLEUM. *J. Chem. Eng. Data, 17(2):158-162, April 1972. 21 refs.*

Enthalpies of combustion measured by rotating-bomb combustion calorimetry are given for 18 organic sulfur compounds including thiols, sulfides, thiophenes, and a disulfide selected for a comprehensive study of their thermodynamic properties. Values of the enthalpy of formation of the condensed phase are derived. Enthalpies of vaporization and enthalpies of formation in the gaseous state are derived for 15 of the compounds. Values of enthalpy of atomization are compared with values predicted by a correlation procedure. (Author abstract)

20689 APTIC NO. 39489

Grovenstein, Erling, Jr. and Arthur J. Mosher

REACTION OF ATOMIC OXYGEN WITH AROMATIC HYDROCARBONS. *J. Am. Chem. Soc., 92(12):3810-3812, June 17, 1970. 16 refs.*

Oxygen atoms were generated by decomposition of nitrous oxide by mercury atoms activated by 2537-A light. For 12 of the 13 aromatic compounds studied, phenolic compounds accounted for more than 95% of the volatile addition products. The absence of solvent effects and greater certainty of the reacting molecules should make this system more amenable to theoretical treatment than liquid-phase aromatic substitutions. In this respect, a plot of the logarithm of the partial rate factors, for attack of O(3P) upon nuclear C-H positions on the present alkylbenzenes, gives a fair linear plot versus the ground state electron density as calculated for individual positions using the CNDO II approximation. This plot implies that the reaction of O(3P) with aromatic hydrocarbons has an early transition state. The correlation further predicts that positions ortho to alkyl groups should be more reactive than para positions as found.

20690 APTIC NO. 38949

Huie, Robert E., John T. Herron, and Douglas D. Davis

ABSOLUTE RATE CONSTANTS FOR THE REACTION OF ATOMIC OXYGEN WITH 1-BUTENE OVER THE TEMPERATURE RANGE OF 259-493 K. *J. Phys. Chem., 75(25):3902-3903, Dec. 9, 1971. 9 refs.*

The reaction of atomic oxygen in its ground electronic state with 1-butene was investigated using the technique of flash photolysis-resonance fluorescence. The reaction was studied at 259-493 K, 20-200 torr total pressure, a 1-butene concentration range of 1.29-12.9 mtorr, and over an approximate initial oxygen atom concentration range of 2 times 10 to the 11th power to 8 times 10 to the 11th power atoms cu cm. The results demonstrate that over these ranges the rate constant for the reaction is both independent of the total pressure and the concentration of either reactant. The reaction data are also shown in the Arrhenius form, along with data obtained by previous workers.

20691 APTIC NO. 38989

Jeffers, Peter and S. H. Bauer

EQUILIBRIUM COMPOSITIONS AT HIGH TEMPERATURES IN SELECTED MIXTURES OF SO2, CO, OXIDES OF NITROGEN, AND HYDROCARBONS. *Combustion Flame, 17(3):432-436, Dec. 1971. 7 refs.*

Equilibrium compositions were calculated for several sulfur dioxide-carbon monoxide, sulfur dioxide-hydrocarbon, and nitrogen oxides-carbon monoxide mixtures as a function of reflected shock temperatures (1400-3000 K). The results are given in equilibrium composition diagrams which make it evident that automobile exhausts should allow nearly complete destruction of nitrogen oxides; possibly catalytic devices will facilitate this step. Hydrocarbons and CO appear about equally effective as reducing agents at high temperatures. Sulfur dioxide, once formed, is a very stable material that is not inclined to self-degrade and is not an efficient high-temperature oxidizer. To minimize pollution by SO2 it is probably best to remove sulfur from fuels prior to combustion, or to use low sulfur fuels; that is, to keep SO2 from ever being formed. (Author conclusions modified)

20692 APTIC NO. 39252

Jenkins, William A.

UNITED STATES COAST GUARD CONTINGENCY PLANNING TO COMBAT MAJOR SPILLAGE OF OIL OR HAZARDOUS SUBSTANCES ON THE WATER. *Preprint, National Security Industrial Assoc., Washington, D. C., 10p., 1967. (Presented at the National Security Industrial Association, December Meeting, Washington, D. C., Dec. 12-13, 1967.)*

The statutory basis for the central role that the Coast Guard has assumed in oil spillage contingency planning in reviewed. Organizational chain of command flow charts have been developed for planning purposes and efforts to gather information on local resources in the prevention or containment of a spill, to increase capability to respond to a spill, and to take selective action to augment existing resources are continuing. Basic precepts to be considered are preservation of life and property, prevention or minimizing the escape of oil or hazardous materials, containment of escaped substances, rapid removal and clean up, and cooperative emergency action. Specific activities in the New England, St. Louis, New York, Gulf of Mexico, and west coast areas are described.

20693 APTIC NO. 39529

Kinumaki, Jo and Hitoshi Tominaga

CONCERNING THE SPEED OF REACTION BETWEEN NITROGEN OXIDE AND HYDROGEN SULFIDE. *(Sanka chisso to ryuka suiso to no hanno sokudo ni tsuite). Nippon Kagaku Zasshi (J. Chem. Soc. Japan), vol. 52:215-221, 1931. 7 refs. Translated from Japanese. 14p.*

The reaction between nitrogen oxide and hydrogen sulfide occurs not in the prefectly dry state, but rather in the presence of water. The reaction accelerates with a rise in temperature. The rise in pressure at the end of the reaction may be caused by the discharge of H2S dissolved in the colloidal sulfur which has been produced. Test apparatus and reaction kinetics are described. (Author summary modified)

20694 APTIC NO. 39289

Kolosov, M. A., A. V. Sokolov, L. V. Fedorova, and R. A. Shirey

RELATIONSHIP BETWEEN ABSOLUTE ATTENUATION OF LASER BEAM INTENSITY AND THE CONCENTRATION OF DROPLETS IN MISTS. *Dokl. Akad. Nauk SSSR (English translation from Russian of: Dokl. Akad. Nauk SSSR), 188:21-24, 1969. 8 refs.*

The optical transparency of a mist was measured with laser beams at the same time as its microstructural parameters were measured photoelectrically. An electronic aerosol meter was developed that is capable of simultaneously measuring seven droplet-size fractions, ranging in radius from 0.5 to 14 micron. The meter will produce reliable measurements of both the spectra and the absolute concentration of the droplets. The relative complexity of the equipment is compensated for by the total automation of microstructural measurements. The equipment will function under both artificial and natural conditions. The relation between laser-beam attentuation and droplet concentration complied with the single-scattering theory in the optical mist- thickness range below seven. This indicates that the attenuation of coherent laser radiation by the mist in the spectral range of 0.63 to 3.39 micron does not differ from that of ordinary noncoherent radiation emanating from thermal sources.

20695 APTIC NO. 39522

Konovalov, G. S., A. A. Ivanova, and T. Kh. Kolesnikova

RARE AND DISPERSED ELEMENTS (MICROELEMENTS) IN THE WATER AND IN THE SUSPENDED SUBSTANCES IN RIVERS OF THE EUROPEAN TERRITORY OF USSR. *(Redkiye i rasseyannyye elementy (microelementy) v vode i vo vzveshennykh veshchestvakh rek yevropeyskoy territorii SSSR). Gidrokhim. Materialy, vol. 42:94-111, 1966. 14 refs. Translated from Russian. 29p.*

Vanadium, manganese, cobalt, nickel, copper, zinc, molybdenum, silver, tin, lead, and bismuth concentrations were determined in river waters of the USSR, both in dissolved and suspended states. Water samples were filtered under vacuum in the laboratory. Suspended substances collected on the filter were dried, ground, and chemically prepared for spectral determination. Bismuth was not discovered in either dissolved or suspended form. Lead, tin, silver, and cobalt were found only in suspended substances, but not in all rivers. Other elements were distributed in the following increasing order of occurrence in dissolved form: V, Mn, Ni, Zn, and Cu.

20696 APTIC NO. 39163

Lassiter, W. S.

INTERACTION OF SULFUR DIOXIDE AND CARBON DIOXIDE WITH CLEAN SILVER IN ULTRAHIGH VACUUM. *J. Phys. Chem., 76(9):1289-1292, April 27, 1972. 20 refs.*

The adsorptive characteristics of sulfur dioxide and carbon dioxide on clean polycrystalline silver under ultrahigh vacuum conditions were investigated by Auger electron spectroscopy and work function measurements. The silver was subjected to SO2 at a pressure of 10 to the minus ninth power torr, and Auger spectra and relative work function measurements were recorded as a function of exposure. The sulfur chemisorbed to the silver surface; the relative work function increased 0.39 eV during an exposure of 0.000006 torr sec. Desorbing the sulfur from the silver by heating lead to as estimation of a minimum heat of desorption of 59 kcal/mol. The silver was cleaned and then subjected to CO2 at 10 to the minus eighth power torr. No change in the Auger spectrum or the relative work function of the silver surface established that no adsorption has occurred. (Author abstract modified)

20697 APTIC NO. 38984

McBride, Paul

SMALL COMMUNITIES CAN HAVE ADEQUATE SOLID WASTE DISPOSAL. *J. Environ. Health, 34(2):195-196, Sept.-Oct. 1971. (Presented at the Annual Educational Conference. 35th, Portland, Ore., June 26-July 2, 1971.)*

In 1971, following the refusal of several other proposals, the Lawrence County Department of Public Health in Indiana received approval to deveolp a landfill with a county-wide containerized trash removal program. A site was selected in the center of the county where core-drilling revealed there was from 14 to 48 ft of sand and clay over a clay and limestone base with the water table at 162 ft. The Health Department then purchased a 20-cubic yard side-loading compactor chassis and 50 4-cubic yard containers. A rebuilt caterpillar tractor was purchased to operate the landfill. Costs are cited.

20698 APTIC NO. 39739

Merryman, Earl L. and Arthur Levy

SULFUR TRIOXIDE FLAME CHEMISTRY - H2S AND COS FLAMES. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 427-436. 17 refs. (Aug. 23-29.)*

The formation and depletion of sulfur trioxide in flat premixed hydrogen sulfide and carbonyl sulfide flames were studied at pressures from 35 to 625 torr. Flame probings in the study indicated that the amount of SO3 formed in a given flame system increases with increasing total pressure in accordance with the three-body reaction SO2 + O + M yields SO3 + M. The data show that attaching hydrogen to the sulfur atom in the sulfur-bearing fuel reduces the amount of SO3 formed in a given flame system. A depletion of SO3 in the post-flame region of both the H2S and COS flames is attributed to the reaction SO3 + O yields SO2 + 02. The consumption of SO3 becomes much more noticeable below 250 torr where the lifetime of the O atoms increases. The depletion of SO3 occurs in different regions of the two flames suggesting that different mechanisms leading to SO3 formation are operating in each flame system. Rate constants were determined for the reaction of SO3 with O atoms in both the H2S and COS flames. The lower activation energy obtained from the H2S flame data was explained in terms of a small contribution from the [illegible]-H reaction, which implies that the latter reaction has a smaller activation energy than the SO3-O reaction. (Author abstract modified)

20699 APTIC NO. 39348

Moldavskiy, O. D.

THE ASSIMILATION OF OXIDE INCLUSIONS BY THE SLAG DURING FILM FLOW OVER THE CONE OF A CONSUMABLE ELECTRODE. *Russ. Met. (English translation from Russian of: Izv. Akad. Nauk SSSR, Metal., no. 6:25-29, 1970. 10 refs.*

Electroslag remelting is a process where the slag may be used to eliminate non-metallic inclusions. The kinetics and mechanism of oxide assimilation during film flow are examined. During the period of film flow down the cone of a consumable electrode, the elimination of oxide inclusions from the metal being remelted occurs at the metal/slag boundary. The rate-limiting stage of this process is the mass transfer of the dissolution products through the slag boundary layer. An essential condition for rapid assimilation of inclusions by a slag during this period is the maintenance of a homogeneous boundary layer in the slag in spite of considerable changes in composition; multi-component fluxes are, therefore, better than binary ones. The steel being remelted is most efficiently cleared of inclusions if the flux components are different from the non-metallic inclusions. Intense mixing of the slag facilities the assimilation of inclusions by the slag. Complete solution of inclusions in the slag does not occur during film flow. Only the surface layers of the particles have sufficient time to enter the slag; the central regions are not adsorbed but are drawn in by the moving metal film. The reaction between the inclusions and the slag during the film flow period leads to a change in their structure. The surface layers of the particles differ in composition from the central regions and contain refining flux components. Particles of this complicated structure are typical of electroslag steel. The greater the chemical activity of the flux with respect to the non-metallic inclusions present in the consumable electrode, the greater the change in the structure of the inclusions. (Author conclusions modified)

20700 APTIC NO. 39262

Moskvitin, V. V. and A. Ye. Smoldyrev

ON THE EFFECT OF SUSPENSION PARTICLES ON HARD FLOW BOUNDARIES. *(O vozdeystvii chastits vzvesi na tverdye granitsy potoka). Text in Russian. Dokl. Akad. Nauk SSSR, 181(2):335-338, 1968. 2 refs.*

A method using detectors and piezoelectric elements was applied to study the action of solid particles on hard boundaries of flows. Reactions of glass spheres of two different diameters in a liquid were studied by filming. Results showed that the oblique particle collisions of very short duration, accompanied by considerable forces, are the main factor in the effects of suspensions on a hard flow surface. Collisons can cause plastic deformations on the material of the hard surface. Normal forces 1000 times the particle weight were found. The duration of the collision is not dependent on the initial speed of the spheres. The normal force can be determined from the normal speed component. The direction of the resultant force is constant at different angeles of collision. The normal force occurring during the collision of particles of irregular shape is about one-third of the corresponding value for spheres. The kinetic energy loss of the particle due to collision amounts to a several percent. Both the duration of the collisions and the depth of penetration in the hard surface are greater for particles of irregular shape. Increasing speed results in increasing departure from the normal distribution of particle collisions. Particle trajectories were also studied on glass spheres.

20701 APTIC NO. 39560

Nelson, Norman H. and Carl A. Jepson

H2S REMOVAL FROM WATER WITHOUT AIR POLLUTION. *Public Works, 94(1):97-98, Jan. 1963.*

The precipitation of sulfides with ferrous sulfate to control hydrogen sulfide fumes from a water supply plant is described. A chemical feeder was installed in the treatment room feeding to the raw water chamber. The dosage was determined by trial and error and was gradually reduced to 2.0 mg/l. At present, ferrous sulfate is not only removing 100% of the H2S from the water supply but also has enabled the amount of alum used to be cut by 50% and the amount of chlorine used reduced by 25%.

20702 APTIC NO. 39591

Ong, Boo Goh and David M. Mason

CATALYTIC DECOMPOSITION OF NITROGEN DIOXIDE ON A HEATED PLATINUM WIRE. *Ind. Eng. Chem. Fundamentals, 11(2):169-174, May 1972. 24 refs.*

In the study of natural convection heat transfer from a horizontally heated platinum wire to the endothermically reacting gaseous system which results from the catalytic decomposition of nitrogen dioxide to yield nitric oxide and oxygen, a very large increase in the heat flux is observed at a wire temperature around 1100 K over a range of pressure from 0.2 to 1 atm. It is postulated that this behavior is due to the fact that below 1100 K. an oxide of platinum shrouds the wire surface which is non catalytic with respect to NO2 decomposition. At temperatures above 1100 K, this oxide sublimes exposing pure platinum metal which catalyzes the decomposition of NO2 and correspondingly causes an increase in heat flux. Such a catalytic effect is not observed on either gold or silica-coated heated wires. From the heat transfer measurements it has been determined that at an oxygen partial pressure of 1 atm platinum oxide has a sublimation point of about 1050 K. From the dependence of heat transfer rates on pressure the decomposition of NO2 appears to be a second-order reaction with respect to NO2. (Author abstract modified)

20703 APTIC NO. 39759

Porstendoerfer, J. and J. Heyder

SIZE DISTRIBUTIONS OF LATEX PARTICLES. *Aerosol Sci., 3(2):141-148, 1972. 6 refs.*

The size distributions of latex particles were measured by means of electron microscopy. Independent of the method used to introduce the particles on the supporting grids of the microscope, the mean particle diameter of the spheres was up to 21% different from the nominal value quoted by the manufacturer of the latexes. The standard deviation of the size distrubutions was in agreement with the quoted value for particles smaller than 0.500 micron in nominal mean diameter. Bigger particles had higher standard deviations than quoted. Electron microscopic studies of latex particles require unshadowed particles, minimum electron intensities, and a microscope with a cooled surrounding for the particles. It is necessary to check the size of the latex particles before using the particles for calibration purposes. (Author abstract modified)

20704 APTIC NO. 39528

Reinders, W. and A. Cats

OXIDATION OF AMMONIA INTO NITRIC OXIDES. *(De oxydatie van ammoniak tot stikstofoxyden). 1911. 14 refs. Translated from Dutch. 16p.*

Using either platinum or ferric oxide as a catalyst, 80-90% of the ammonia can be oxidized into nitric acid and nitrous acid. In addition to the form in which the catalyst is used, the velocity of the gas current has a considerable influence on the reaction. The most favorable reaction temperature was found to be 600 C for platinum-asbestos and platinum-glass, and 650-700 C for ferric oxide. Reaction kinetics and mechanisms are discussed, as well as the experimental arrangement. (Author summary modified)

20705 APTIC NO. 39048

Reutov, O. A., V. D. Makhayev, E. V. Uglova, and V. S. Petrosyan

HALOGEN EXCHANGE BETWEEN ORGANIC AND ORGANOMERCURIAL HALOGENIDES. *(Obmen mezhdu organicheskimi i atutorganicheskimi galogenidami). Text in Russian. Zh. Obshch. Khim., 41(12):2710-2712, Dec. 1971. 8 refs.*

Paramagnetic resonance and thin-layer chromatography techniques were applied to study the halogen exchange reactions occurring between organic and organo-mercurial halogenides. The occurrence of such exchange reactions was ascertained between tertiary alkyl iodide and methylmercury chloride or bromide; exchange reactions between tertiary alkyl bromide and methyl mercury chloride also occurred. No halogen exchange could be observed to occur between tertiary alkyl chloride and methyl mercury bromide, tertiary alkyl chloride and methyl mercury iodide, or between tertiary alkyl bromide and alkyl mercury iodide. Paramagnetic resonance absorption spectra of reactants and reaction products in dichloroethane solution are reproduced. The exchange reactions occurred always in the direction generating organomercurial halogenides with the highest stability constant.

20706 APTIC NO. 39468

Ripper, Maximilian

SULFUROUS ACID IN WINES AND ITS DETERMINATION. *(Die schweflige Saeure im Weine und deren Bestimmung). Text in German. J. Prakt. Chem., vol. 154:428-473, 1892. 33 refs.*

Methods for determining sulfurous acid in stummed wines are described. The wine was distilled in hydrogen flow at 80 C, and the distillate thus obtained was analyzed for sulfurous acid by means of iodine titration, using potassium hydroxide and sulfuric acid. The result obtained was in good accordance with that of the Haas method; the difference was 0.6 mg of SO2. Sulfurous acid could also be titrated directly in wine with starch solution added. To ascertain the different forms of sulfurous acid in wine, the behavior of sulfurous acid towards silver nitrate, potassium hydroxide, ethyl alcohol, and aldehydes was studied. It is present in wines in the form of free sulfurous acid and aldehyde sulfurous acid. Free and total sulfurous acids were directly determined by means of iodine titration, while three distinct stages were observed. The aldehyde sulfurous acid was determined from the difference of the total and free sulfurous acid. No volatile, iodine-oxidizable components were found in wines. The formation of aldehyde sulfurous acid is most intensive during the first month following fumigation, while unimportant oxidation processes can always be observed. The determination of sulfuric acid represents a high-precision method provided the barium sulfate to be used for the analysis is purified by means of hydrobromic acid and hydrochloric acid.

20707 APTIC NO. 39605

Romanet, Rene

THE PHYSICO-CHEMICAL ASPECTS OF ODORS. *(Le probleme de l odeur. Aspect physico-chimiques). Text in French. Ind. Parfum., vol. 7:376-381, 1952. 34 refs.*

The perception of odor is due to direct action of gaseous molecules (which have a certain vapor tension) on olfactory receptors, thus invalidating all theories based on vibration, mechanical, or electromagnetic reasons. The previously held belief that a molecule had to be water-soluble to have an odor is also invalid; whether fat-solubility is a condition has not yet been resolved. Odor cannot be attributed to any single atom of an odorous molecule nor to any functional group. While odorous substances occur in all organic categories, they are most frequent among aldehydes, esters, and lactones. Experimental evidence has confirmed that the origin of odor must be sought in the spatial configuration of the odorous molecule or of one of its parts. This evidence involves differences in the odor of isomers (displacement of ketonic groups in linear C-10 chains), differences in odor between stereoisomers (trans and cis-stereoisomers of A-norandrostanol-2 in musk), odor variation in the same homologous series (cyclopentadecanone, cyclononadecanone), and the similarity of odors emitted by compounds of analogous structure (ketones, lactones, anhydrides, esters, and secondary cyclical amines emit similar odors if the number of atoms in the chain is identical: thus musk is characteristic for 14 to 17 atoms in a chain, civet generally for 18 atoms). In contrast, the inverse of the last rule does not apply: compounds emitting a similar odor can generally be of different structure. It seems that free electrons which govern the chemical behavior of a compound also play a fundamental role in its odorant properties (isosteric molecules with an equal number of free electrons like benzene, pyrrol, benzoic aldehyde, or furfural). To arrive at the cause of an odor it is thus absolutely necessary to prepare the odorous substance in a pure state and to identify molecular structure by means of molecular absorption spectra.

20708 APTIC NO. 39359

Schoonheydt, R. A. and J. H. Lunsford

AN ELECTRON PARAMAGNETIC RESONANCE STUDY OF SO2- ON MAGNESIUM OXIDE. *J. Phys. Chem., 76(3):323-328, 1972. 28 refs.*

When sulfur dioxide is adsorbed on thermally activated and ultraviolet irradiated magnesium oxide, two negative radical ion SO2 species are formed. The principal values of the g-tensor, the 33S tensor, and 17 oxygen were computed for the two radical ions. The odd electron, transferred from the surface of MgO to SO2, occupies a 2bl double prime antibonding molecular orbital and is mainly concentrated on the S atom. The first radical negative ion SO2 (A) is thermally more stable than SO2 (B), and their concentration ratio depends on the pretreatment of MgO. Both species are assumed to be located on oxygen ion vacancies. The SO2 negative ion is probably oriented with its oxygen atoms toward the surface. The binding forces are purely electrostatic. (Author abstract modified)

20709 APTIC NO. 39787

Shaw, R. W., Jr. and T. D. Thomas

SEARCH FOR CORE ELECTRON SATELLITES IN CARBON MONOXIDE. *Chem. Phys. Letters (Amsterdam), 14(1):121-123, May 1, 1972. 10 refs.*

The carbon (1s) and oxygen (1s) photoelectron spectra of carbon monoxide in the gas phase have been measured in a search for strong satellite peaks. Such satellites have been observed in solid metal carbonyls but are not expected in carbon monoxide according to their model description of the origin of the satellites. Experimental evidence shows that satellite peaks comparable to those found in metal carbonyls do not appear in the carbon monoxide spectrum. A satellite is, however, observed at 13-19 eV below the principal oxygen (1s) peak in carbon monoxide; it does not appear in the carbon (1s) spectrum. This satellite is associated with a shakeup process in which the ejection of the oxygen (1s) electron is accompanied by promotion of an electron from a molecular orbital centered principally on the oxygen nucleus.

20710 APTIC NO. 39711

Shigorin, V. D. and G. P. Shipulo

LASER EXCITATION OF ORGANIC MOLECULES PHOSPHORESCENCE. *(O lazernom vozbuzhdenii fosforestsentsii organicheskikh molekul). Text in Russian. Zh. Prikl. Spektrii., 12(2):331-333, 1970. 8 refs.*

Organic molecule phosphorescence with multiphoton absorption was studied. The durations of the lower triplet states were measured, and, for a few compounds, luminescent spectra were photographed. The substances studied were polycrystals in solid solutions, while the solvents used were ethanol and methylcyclohexane. Monoimpulse excitations were made with durations of 25 nanosec, and, for comparison, by means of a flash. The required number of laser impulses was 10-50. The measurements were made at the temperature of liquid nitrogen. Long afterglows were observed. The attenuation was exponential, with the same constant for laser and flash. The duration was independent of the laser intensity in the case of 9,10-anthraquinone. The effect observed was really phosphorescence occurring in connection with monomolecular or quasimolecular processes. No noticeable changes in the character of the phosphorescence could be revealed in a high-intensity field of about 100,000 V/cm. A quadratic relationship between phosphorescence intensity and laser intensity could be revealed for polycrystals of 9,10-anthraquinone, 2-chlorine-3-bromine-anthraquinone, and N-ethylacrydone, but multiphoton excitation could as well be assumed for other molecules.

20711 APTIC NO. 39450

Singh, Trilochan and Robert F. Sawyer

CO REACTIONS IN THE AFTERFLAME REGION OF ETHYLENE/OXYGEN AND ETHANE/OXYGEN FLAMES. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 403-416. 29 refs. (Aug. 23-29.)*

The kinetics of carbon monoxide disappearance in the afterflame zone of ethylene/oxygen and ethane/oxygen flames at equivalence ratios of 0.67, 0.80, and 1.0, supported on a water-cooled, poroussplate-top, rectangular, flat-flame burner were investigated. The composition profile of stable species, such as CO, carbon dioxide, oxygen, water, and hydrogen, were obtained by mass spectrometric analysis of gas samples. The profiles of hydroxyl radical and rotational temperatures were obtained by using ultraviolet-absorption spectroscopy. Theoretical multicomponent diffusion coefficients were used for calculating the net reaction rate for each species from the composition and temperature profiles. The uncertainties in theoretical diffusion coefficients do not significantly affect the reaction rate profile of major stable species, but result in a high uncertainty for the reaction rates of hydroxyl radical and molecular hydrogen. The measured mole fraction of hydroxyl radical shows consistent disagreement with those calculated from partial equilibrium hypothesis. A simple global first-order rate equation is given to represent the overall rates of CO disappearance and CO2 appearance. (Author abstract modified)

20712 APTIC NO. 38875

Spurny, Kvetoslav

PREPARATION AND PROPERTIES OF HIGHLY DISPERSED AEROSOLS FOR BIOLOGICAL EXPERIMENTS. *(Priprava a vlastnosti vysokodispersnich aerosolu pro biologicke pokusy). Text in Czech. Pracovni Lekar. (Prague), 23(9):321-325, Sept. 1971. 31 refs.*

Highly dispersed aerosols are defined as particles of less than 0.1 micron average diameter, contained in a dispersion system. Sedimentation of such aerosols does not occur, whereas settling on instrument and tube surfaces and in breathing organs can be quite intense. Such aerosols are present in the atmosphere as a result of both natural processes in plant life industrial activities, for example, from the melting of metals and the manufacture of certain chemical products. For purposes of research on the physical, chemical, and biologic properties of these aerosols it is useful to produce them experimentally, and to be able to measure their principal parameters, i.e., concentration and average particle size. A typical method of obtaining such aerosols from inorganic chemical substances such as metals is to heat the substance inside a small chamber and pass a carrier gas such as air, oxygen, or helium through the heating chamber to form a vapor which carries off particles released from the surface of the heated material. Subsequent cooling and condensation leads to the formation of the aerosols. By controlling the heating temperature and the flow speed of the carrier gas, various sizes and concentrations of aerosols can be obtained. Practical applications include the use of highly dispersed aerosols for testing the effectiveness of special filters and in biologic experiments with animals involving inhalation of prepared highly dispersed aerosols of specified characteristics.

20713 APTIC NO. 39452

Symons, J. M., R. E. McKinney, R. M. Smith, and E. J. Donovan, Jr.

DEGRADATION OF NITROGEN-CONTAINING ORGANIC COMPOUNDS BY ACTIVATED SLUDGE. *Intern. J. Air Water Pollution (London), 4(1/2):115-138, June 1961. 12 refs. (Presented at the Conference on Biological Waste Treatment, Manhattan College, New York, April 20-22, 1960.)*

Activated sludges were grown in 1.5-liter pilot plants. The aeration period was 23 hr. After a 1-hour settling period, 1.0 liter of supernatant liquor was withdrawn, 1.0 liter of tap water replaced, organics and buffer added, and aeration resumed. This cycle was repeated seven days a week for the duration of the study. No supplemental nitrogen was added to the systems. Replicate samples of washed mixed liquor were placed in respirometer flasks immediately after feeding. At various times of the next day a flask was removed from the respirometer, its contents passed through a membrane filter, and the filtrate analyzed for chemical oxygen demand (COD) and all inorganic nitrogen forms. The change in COD and nitrogen was then correlated with the oxygen uptake to determine the mechanism of nitrogen release. Nutrient broth; alanine; propyl amine; o-, m-, and p-amino Na benzoate; o-, m-, and p-nitro Na benzoate; propionitrile; and benzonitrile were all biologically degradable by activated sludge. The nitrogen-containing compounds which were biologically degradable released their nitrogen into solution during metabolism. Once in solution, the nitrogen could be used for synthesis. A brief literature review concerning the biologic metabolism of amino nitrogen, nitro nitrogen, and cyano nitrogen is included.

20714 APTIC NO. 38985

Tan, C. W. and J. W. Thomas

AEROSOL PENETRATION THROUGH A PARALLEL-PLATE DIFFUSION BATTERY. *Aerosol Sci., vol. 3:39-43, Feb. 1972. 5 refs.*

The problem of diffusional losses of particles from a fluid flowing through a duct of rectangular cross section was reinvestigated. Equations now in use contain small errors and a more accurate version has been developed. In addition, a detailed table showing fractional penetration of a diffusion battery as a function of battery dimensions, diffusion coefficient, and flow rate is presented. (Author abstract)

20715 APTIC NO. 39651

Tanaka, Ken-ichi and George Blyholder

PHOTOCATALYTIC AND THERMAL CATALYTIC REACTION OF CARBON MONOXIDE WITH NITROUS OXIDE AND OXYGEN OVER ZINC OXIDE. *Chem. Commun., no. 14:736-738, July 21. 1971. 5 refs.*

The photocatalytic and thermal catalytic oxidation of carbon monoxide over zinc oxide is more complex than previously observed in that the illuminated and dark reactions obey different kinetics and that nitrous oxide is also effective in oxidizing CO. The experimental reaction was followed by gas chromatographic analysis of nitrogen in the reaction of N2O with CO, and N2 and oxygen in the case of the competitive reaction of CO with N2O and O2. Fresh ZnO which has been oxidized and evacuated at about 410 C has a high catalytic activity for the reaction of N2O with CO, but the activity decreases with each subsequent run, arriving at a stabilized activity after several runs. The stabilized catalyst gave a reproductible activity if the evacuation time between runs was kept constant. Initial rates were determined and used to derive rate equations. It was determined that neither thermal nor photocatalytic decomposition of N2O occurs on zinc oxide with a detectable rate at 203 C. Results indicate that the thermal oxidation of CO over ZnO with O2 and N2O are similar, while the photooxidations with O2 and N2O are dissimular to each other.

20716 APTIC NO. 39117

Tas, Albert C. and Rudolph H. de Vos

CHARACTERIZATION OF FOUR MAJOR COMPONENTS IN A TECHNICAL POLYCHLORINATED BIPHENYL MIXTURE. *Environ. Sci. Technol., 5(12):1216-1218, Dec. 1971. 13 refs.*

The major constituents of a phenochlor DP 6 chlorinated biphenyl mixture were identified using data based nuclear magnetic resonance, infrared radiation, and gas-liquid chromatography spectra. The exact structures of the constituents, two each of hexachlorobiphenyls and heptachlorobiphenyls, were determined by synthesis. The melting points of the isolated fractions showed no depression when mixed with the corresponding synthetic material. The symmetric compounds may be useful for toxicity studies. (Author abstract modified)

20717 *APTIC NO. 39090*

Tauber, Selmo

LINEAR ALGEBRA IN AIR POLLUTION PROBLEMS. Atmos. Environ., 6(4):279-281, April 1972. 1 ref.

Linear algebra or the representation of a set of chemical reactions by matrix-vector methods is specially well suited for air pollution chemistry. An air polluting system such as a plant or factory reacts with an existing mass of air. The state of the air mass before reaction can be represented by a vector x and the state of the air mass after reaction by a vector y. The changes can be written in the form of a matrix M. so that Mx equals y. The air polluting system is characterized by the matrix M. This gives the possibility to compare, classify, and standardize the effect of such systems. Moreover, the matrix-vector representation is ideally suited for computer input, thus for computer controlled operations which makes it possible to work with a very large number of components.

20718 APTIC NO. 39049

Usacheva, G. M. and G. Kh. Kamay

PHOSPHORUS TRICHLORIDE INTERACTIONS WITH TERTIARY ARSINE SULFIDES. *(O vzaimodeystvii trekhkhloristogo fosfora s sulfidami tretichnykh arsinov). Text in Russian. Zh. obshch. Khim., 41(12):2705-2709, Dec. 1971.*

The interactions between some tertiary arsine sulfides with phosphorus trichloride were studied within the framework of tertiary arsine sulfide reactions with electrophilic compounds. Tri-n-alkyl- and phenyl-n-alkylarsine sulfides generated tri-n-alkyl- and phenyldi-n-alkylarsine dichlorides respectively, and phosphorus sulfides, upon treatment with phosphorus trichloride. Interactions of triphenylarsine sulfide with phosphorus trichloride produced triphenylarsine and phosphorus thiotrichloride. Reactions between tri-n- alkylarsines and phosphorus trichloride produced tri-n-alkyl and phenyldi-n-alkylarsine dichlorides and phosphorus sulfides. It is assumed that the interactions between tri-n-alkyl- and phenyldi-n- alkylarsine sulfides and phosphorus trichloride occur through an intermediate step of tri-n-alkyl- and phenyldi-n-alkylarsine, and phosphorus thiotrichloride formation.

20719 APTIC NO. 39590

Walther, Eric G.

A CLASSIFICATION FOR GAS TO AEROSOL CONVERSIONS. *Aerosol Sci., 3(2):149-152, 1972. 21 refs.*

The first way to form an aerosol is to break up bulk material, liquid or solid, into pieces small enough to become suspended in air. This process is called comminution when a solid is pulverized to powder, and nebulization when a liquid is broken into droplets. The second way to form an aerosol is to combine gas molecules into liquid or solid particles, called gas-to aerosol conversion. The physical nature of any gas-to-aerosol conversion can be helpfully classified into one of fives types of molecular aggregation for the final aerosol formation preceded by one on nine processes for the formation of the final gas molecules that aggregate into the aerosol. Twenty-eight conversions are so classified. (Author abstract modified)

20720 APTIC NO. 39778

Wang, R. L.

A SOLID REACTANT PARTICLE IN A GASEOUS POLLUTANT SYSTEM OF VARIABLE STRENGTH. *Bull. Environ. Contamination Toxicol., 7(2/3):65-71, Feb.-March 1972. 7 refs.*

Parametric effects of a solid-gas system on the rate of reduction of gaseous pollutant levels are studied by means of a general case of a solid additive in a receding pollutant level. The model presents a spherical solid reactant surrounded by a gaseous sphere with a shell of solid product forming around the reactant core in the process of the reaction. The efficiency of this reaction is studied by an examination of the rates of boundary movements of these three spheres in the reaction. The final gas concentration in the system and the location of moving boundary are sensitive to various parametric factors, especially the surface/volume ratio of the solid particle, the relative radius of the particle, the initial gas concentration, and the material property. Diffusivity is a less important factor. This analysis can be used to study dry methods of sulfur dioxide in a stack gas system.

20721 APTIC NO. 39041

Weinstock, E. M., R. N. Zare, and L. A. Melton

LIFETIME DETERMINATION OF THE NO A 2SIGMA+ STATE. *J. Chem. Phys., 56(7):3456-3462, April 1, 1972. 20 refs.*

A coincidence of the Te I emission line at 2147.25 A with the Q-sub 1(21/2) and QP-sub 21(21/2) absorption lines of the (1,0) band of the nitric oxide gamma system is used to perform a Hanle effect measurement on the v (prime) equal to 1, N (prime) equal to 10 level of the NO A 2Sigma+ state. A linear least squares fit to the pressure-broadended data yields an intercept of 3.37 plus or minus 0.36 G for the zero-pressure linewidth and a slope of 12.7 plus or minus 2.4 mG/mtorr. By measuring the zero-field polarization of the resolved fluorescene lines, the ratio of the hyperfine splitting to the rotational spin splitting is estimated to be less than or equal to 1:5, and the angular monentum coupling scheme is found to conform closely to Hund s case. An optical radio-frequency double resonance study provides further confirmation. Using g values appropriate to Hund s case, the radiative lifetime is determined to be 178 plus or minus 19 nsec. These results are in excellent agreement with the previous Hanle-effect measurements by German, Zare, and Crosley on the v(prime) equal to 1, N(prime) equal to 13 level. (Author abstract)

20722 APTIC NO. 39555

Wright, James R. and Paul G. Campbell

PHOTOOXIDATION OF ASPHALTS IN THE PRESENCE OF OZONE. *J. Res. Nat. Bur. Std., 68C(4):297-304, Oct.-Dec. 1964. 10 refs.*

As part of a program to study the environmental conditions which influence asphalt degradation, in relation to smog formation, the effects of ozone on the photooxidation of coating-grade asphalts were compared with those of air and of oxygen under a variety of radiant energy conditions. Oxidative changes were measured by infrared spectroscopy and by the time to film failure as denoted by cracking. Surfaces of non-catalyzed asphalts were oxidized when treated with ozone in total darkness, room light, solar radiation, and the radiant energies of the carbon and xenon arcs. No 0xidation was detected when the asphalts were exposed to room light in oxygen alone. A ferric chloride-catalyzed asphalt was not oxidized by ozone in total darkness. Photooxidation rates of all asphalts increased as exposures were made to carbon-arc radiation in air, in oxygen, and in ozone-enriched oxygen. Each asphalt exhibited a different oxidative response to solar, xenon-arc, and carbon-arc radiant energy sources. (Author abstract modified)

20723 APTIC NO. 38828

Yokoyama, Yoshio and Gihee Konno

DISSOCIATION PRESSURE OF SO2-QUINOLCLATHRATE AND A METHOD FOR ITS DETERMINATION. *J. Chem. Eng. Jap., 4(3):213-216, Aug. 1971. 6 refs.*

A method of general applicability and reasonable accuracy for the determination of the dissociation pressure of quinolclathrate is proposed. Hydrogen sulfide and sulfur dioxide from petroleum refining can be crystallized as quinolclathrate from an aqueous solution of hydroquinone. To evaluate the absorptivity quantitatively, the data of dissociation pressures of H2S and SO2-quinolclathrate are necessary. In the present method, a mixture of SO2 and nitrogen is brought into contact with the solution in which is suspended a considerable amount of quinol, until SO2-quinolclathrate crystallize sufficiently. Equilibrium is established by gas circulation at a given temperature. The total pressure of the system is maintained at 1 atm by the addition of nitrogen. After 4 hours, temperature and the pressure of the system are measured, and SO2 in the gas sampler is fixed by alkaline solution and determined iodimetrically. The volume of the gas sampler between the two taps was previously determined by measuring the weight of water contained. To confirm the time for the establishment of equilibrium, the concentration change of SO2 in liquid was investigated for both decomposition and formation of the clathrate for various gas flow rates.

EFFECTS-HUMAN HEALTH

20724 APTIC NO. 39009

Yokkaichi Municipal Office (Japan), Bureau of Hygiene

OUTLINE OF ENVIRONMENTAL HAZARD IN YOKKAICHI CITY. *(Yokkaichi-shi ni okeru kogai no gaikyo). Text in Japanese. 72p., June 1969.*

The environmental hazard in Yokkaichi is due to a rapid construction of enormous petroleum complexes closed or mixed with residential areas and to a violent change of environmental conditions coupled with the influence of climatic factors. Air pollution, offensive odor, noise, vibration, and water pollution under such backgrounds were discussed. Air pollution is mainly due to sulfur oxides the decreasing of pollution caused by the construction of high chimneys over 95 m has been observed recently. Compared with other industrial districts, soot and dust are less for fuel oil is mainly depended upon. Though offensive odor is limited and is only a problem near the emission source, it makes the inhabitants psychologically irritated. More than 70% of the complaints against the pollution are directed toward offensive odor. Among the environmental hazards, air pollution gives the most severe effect on citizens health. The association of public health care for environmental hazards in Mie Prefecture was established in 1967. As a result of various investigations by this association, it was observed that existence of subjective symptoms, depression of pulmonary function, morbidity, and mortality caused by respiratory diseases showed a higher rate at contaminated areas than at non-contaminated districts. Since 1960, Yokkaichi City has been consciously reflecting its effort to pollution control in the administration of various fields such as health and hygiene, technical development, city planning, promotion of pollution control and countermeasure at the level of emission sources, and so on. Related regulations, data of medical examinations of the inhabitants, measuring data of pollution are also included in the report.

20725 APTIC NO. 39439

Public Health Service, Washington, D. C.

THE HEALTH CONSEQUENCES OF SMOKING. 1969 SUPPLEMENT TO THE 1967 PUBLIC HEALTH SERVICE REVIEW. *PHS-1696-2, 98p., 1969. 437 refs.*

Pertinent medical literature on the health consequences of smoking are reviewed. Data confirm the judgment that cigarette smoking is a significant risk factor that contributes to the development of coronary heart disease, apparently by promoting myocardial infarct and cardiac arrhythmias. Autopsy studies show that cigarette smoking is associated with a significant increase in atherosclersis of the aorta and the coronary arteries. Cigarette smokers may have significant disease of the small airways in the absence of bronchopulmonary symptoms. Studies also demonstrate that smoking may significantly impair pulmonary clearance. A major pathologic study of histologic changes in the larynx demonstrated a dose-relationship between smoking and premalignant changes in the larynx. New data are presented which confirm that maternal smoking during pregnancy is associated with low birth weight in infants and also indicate that maternal smoking is associated with an increased incidence of prematurity defined by weight alone. Data on noncancerous oral disease lead to the conclusion that ulceromembranous gingivitis, alveolar bone loss, and stomatitis nicotina are more commonly found among smokers that among non-smokers. In addition, there is evidence that smoking may be associated with edentulism and delayed socket healing. (Author summary modified) ½

20726 APTIC NO. 39540

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare

SUMMARY OF TENTATIVE CONCLUSIONS. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 3-6, 1969.*

The probable effects of chronic exposure to low levels of carbon monoxide on human health, behavior, and performance are outlined. The importance of CO in the ambient air lies principally in its ability to combine with hemoglobin. The portion of Hb present in the form of carboxyhemoglobin cannot combine with oxygen or carry oxygen from the lungs to body tissues. Mental performance appears to be impaired at 2% COHb above background level (0.4%). Although normal persons can compensate for some increase in inspired CO (through increased Hb concentration in the blood, increased cardiac output, or increased capillary blood volume), those with tissue hypoxia or less than normal oxygen in alveolar air might be more susceptible to the effects of low levels. There is evidence of a slight increase in mortality among patients with myocardial infarction following sustained exposure to more than 10 ppm CO. Whether CO in cigarette smoke produces adverse health effects remains to be determined.

20727 APTIC NO. 39542

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare and Robert E. Forster

REACTIONS OF CARBON MONOXIDE WITH HEME PROTEINS. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 10-13, 1969. 9 refs.*

Carbon monoxide reacts with the iron of porphyrin, and the reaction affects hemoglobin (Hb), myoglobin (Mb), cytochrome oxidase (cytochrome a + a3), and cytochrome P450. Both Hb and Mb bind CO reversibily. There are two main deleterious effects of carboxyhemoglobin: The first is that COHb cannot carry oxygen, and its presence thus decreases the transport function of the blood, lowering the mixed venous and tissue pO2. A second effect is that the O2Hb dissociation curve becomes relatively more hyperbolic. The carboxymyoglobin should not increase significantly with low CO concentrations in the inspired air, except in extreme situations. Cytochrome oxidase is the primary oxygen-reducing enzyme of the body. It will bind CO and, therefore, reduce its oxidase activity. Cytochrome P450 may be involved in anabolic as well as detoxification pathways; significant inhibition is not likely to occur under survival conditions. Similarly, CO does not appear to inhibit the function of hydroperoxidases (catalase and peroxidase) that catalyze reactions in which hydrogen perioxide is an electron acceptor.

20728 APTIC NO. 39544

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric

Contaminants on Human Health and Welfare and Robert E. Forster

CARBON MONOXIDE PRODUCTION BY ORGANISMS. In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 16, 1969. 4 refs.

Carbon monoxide is produced in man at the rate of 0.42 ml/hr and is presumably found in all vertebrates. The largest part of this CO arises from the catabolism of hemoglobin, whose rate of destruction is approximately equal to the rate of CO production. The turnover of myoglobin is slower than that of Hb and there is less of it, so its contribution to CO production is less. Other heme-containing enzymes, such as P450 cytochrome, may turn over rapidly enough to produce significant amounts of CO in spite of their low steady-state concentrations.

20729 APTIC NO. 39547

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare, Solbert Permutt and Leon Farhi

TISSUE HYPOXIA AND CARBON MONOXIDE. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 18-24, 1969. 8 refs.*

The relationship between tissue hypoxia and decrease in venous oxygen in the presence of carbon monoxide was studied by examining the lowering of venous pO2 in terms of equivalents; i.e., how low arterial pO2, blood flow, or hemoglobin concentration would have to fall to produce a similar effect on venous pO2 in the absence of CO Assuming a CO level of 70 ppm, venous pO2 would be lowered by 4-6 mm Hg in a normal subject (arterial pO2, 100 mm Hg). A comparable reduction in the absence of CO would require a 13-37% decrease in blood flow and Hb concentration or a 23-46% decrease in arterial pO2. Thus, the effect of a 4-6 mm Hg reduction in venous pO2 on tissue oxygenation might be as great as lowering arterial pO2 from 100-54 mm Hg. Results of venous pO2 and equivalent calculations are tabulated for a normal subject and for a subject with low arterial pO2 (50 mm Hg).

20730 APTIC NO. 39548

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare and Bertram D. Dinman

EFFECTS OF LONG-TERM EXPOSURE TO CARBON MONOXIDE. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 25-28, 1969. 14 refs.*

Whether such a condition as chronic carbon monoxide intoxication exists is still undetermined. Animal experimentation suggests that pathologic sequelae follow exposures to 100 ppm for slightly over 300 hr, but studies of occupationally exposed groups have demonstrated no medical sequelae to long-term exposure. Study of occupational groups with high CO exposure should be reattempted using more sophisticated techniques of medical evaluation. The use of Old-Age and Survivors Insurance records for long-term follow-up is recommended. Because cigarette smoking is associated with substantial CO exposures, it is possible that health effects associated with smoking reflect the long-term effects of repeated exposures to CO. The fact that smoking simultaneously involves exposure to other gases and particulate pollutants will complicate such an interpretation.

20731 APTIC NO. 39549

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare and Bertram D. Dinman

REVIEW OF ELECTROENCEPHALOGRAPHIC DATA. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 29-31, 1969. 7 refs.*

The bulk of the literature on electroencephalographic changes in response to carbon monoxide exposure is not based on sophisticated techniques; rather, such reports dtpend on subjective analysis, e.g., cerebral dysrhythmias, or simple statistical analysis of waveforms, basic rhythms, or voltage changes. In addition, much of the relevant literature deals the EEG patterns produced by severe CO intoxication. The subjectivity that affects most EEG analyses could be overcome by use of new computational methods for analysis of electrocortical voltage or frequency alterations.

20732 APTIC NO. 39550

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare, and Victor G. Laties, Rodney R. Beard, Bertram D. Dinman, and John D. Schulte

BEHAVIORAL ASPECTS OF CARBON MONOXIDE POISONING. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 32-37. 17 refs.*

Most investigators have first noticed symptoms of carbon monoxide poisoning when the level of carboxyhemoglobin was raised to between 10-20%. The symptoms are usually vague and include mild frontal headaches, generalized weakness, fatigue, and drowsiness. In study of human performance, one investigator observed that 20% COHb impaired the ability of healthy subjects to solve arithmetic problems. Another researcher found no effects on arithmetic performance in subjects who worked at slightly higher COHb levels. In a recent study, subjects showed decreased ability to judge tone duration following exposures (50-250 ppm CO) long enough only to produce a predicted COHb level of less than 2%. If this finding is replicated, scientists will have to look much more closely at the effects of COHb levels previously considered of little behavioral significance. In future behavioral work, the determination of COHb levels and close monitoring of atmospheric CO concentrations should be encouraged.

20733 APTIC NO. 39551

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare and Arthur B. DuBois

ADAPTATION TO CARBON MONOXIDE. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 38-39, 1969. 1 ref.*

The possibilities for adaptation of man to carbon monoxide are biochemical, physiologic, and psychologic. Biochemical adaptation processes might include increased detoxification of CO by endogenous metabolism and changes in the anaerobic versus aerobic metabolism rates. Physiologic adaptation processes include increased hemoglobin concentration and cardiac output and possibly increased plasma volume and alveolar ventilation. Psychologic adaptation could occur by learning new material in the presence of CO, relearning old material, or revising a task to adapt to altered temporal perception. The cost of biochemical or physiologic adaptation might be reflected in altered life span incidence of illness and encroachment on maximal work capacity reserves or biochemical or endocrine system reserves. The cost of psychologic adaptation might be accidents.

20734 APTIC NO. 39552

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Effects of Atmospheric Contaminants on Human Health and Welfare, John R. Goldsmith, Rodney R. Beard, and Bertram D. Dinman

EPIDEMIOLOGIC APPRAISAL OF CARBON MONOXIDE EFFECTS. *In: Effects of Chronic Exposure to Low Levels of Carbon Monoxide on Human Health, Behavior, and Performance. p. 40-60, 1969. 25 refs.*

Numerous epidemiological studies provide evidence that exposure to carbon monoxide will increase carboxyhemoglobin concentrations in man. The amount of the increase is reasonably predictable and must be considered in relation to exposure to CO in inhaled cigarette smoke and in occupational and domestic exposures. Exposures to 10-12 ppm CO for 5 hr will increase COHb levels in nonsmokers by approximately 0.5%, while exposure to 30 ppm CO for 8-12 hr can lead to 5% COHb. In sensitive persons, community exposures that produce 5% COHb could increase mortality and morbidity. Such persons include those with severe anemia, chronic pulmonary disease, and impaired circulation, and newborn infants. Apart from increase in COHb, three possible effects of CO have received major consideration in epidemiologic studies: chronic intoxication, mortality in hospitalized patients with myocardial infarction, and the contribution of CO to motor vehicle accidents. There is no evidence that community air pollution exposures produce any type of chronic effects specific to CO, but exposure to daily CO levels in excess of 10 ppm may be associated with increased mortality in myocardial infarction patients. The possibility exists that an increase in COHb influences the frequency of accidents.

20735 APTIC NO. 39565

Albu, Anatol, E. Schuleri, L. Crocos, Cornelia Diaconescu, and V. Lungu

DIFFERENTIAL DIAGNOSIS OF PULMONARY SIDEROSIS AND OCCUPATIONAL SIDEROSILICOSIS AND OTHER LUNG DISEASES CHARACTERIZED BY GENERAL MICRONODULAR OPACITIES. *(Diagnosticul differential al siderozei pulmonare si al silicosiderozei profesionale cu alte pneumopatii generatoare de opacitati micronodulare pulmonare generalizate). Text in Romanian. Viata Med. (Bucharest), 18(5):211-217, March 1971. 43 refs.*

The differential diagnosis of occupational siderosis and siderosilicosis which result from exposure to iron-oxide dust with or without silica admixtures, and are characterized by micronodular radiographic opacties, a clinical picutre presenting few or no pathological symptoms, and almost normal lung function values are examined. The most frequent confusions which may arise in everyday practice are considered, and recommendations to limit differential diagnosis to cover a maximum number (7-9) of conditions with great radiological similarities are presented.

20736 APTIC NO. 39201

Altner, H.

NEUROLOGICAL RESPONSES TO ODORANTS. *Preprint, Environmental Protection Agency, Washington, D. C., 10p., 1971. 32 refs. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Neurologic responses to odorants are reviewed with regard to the input to the central nervous system, pathways in the olfactory centers, and the electrophysiology of the olfactory bulb and related forebrain structures. There are two points of interest in the pathways: the fiber connections and major pathways; and the inner structure of the olfactory bulb. The results of morphologic studies are discussed and responses to odorous stimuli, with emphasis on the role of inhibition, are examined.

20737 APTIC NO. 38947

Amdur, Mary O.

AEROSOLS FORMED BY OXIDATION OF SULFUR DIOXIDE. *Arch. Environ. Health, 23(6):459-468, Dec. 1971. 27 refs.*

Literature relating to the toxicology of sulfuric acid and particulate sulfates is reviewed. These materials, which have a greater irritant potency than sulfur dioxide, may be formed in the atmosphere by oxidation of SO2. Thus, air quality standards for SO2 must taken into account the toxicology of these oxidation products. Data on concentration alone are insufficient to predict irritant potency; particle size is a critical factor in determining both the nature and degree of response. Thus at concentrations of 2 mg/cu m, 0.8-micron H2SO4 particles have been shown to produce a greater response in guinea pigs than do 2.5-micron particles, i.e., there was both an increase in pulmonary resistance, accompanied by a lesser decrease in compliance, and an increase in elastic, resistive, and total work of breathing. The response was prompt in onset and indicative of narrow of the airways. In the case of animals exposed to high concentrations, the response to 2.5-micron particles was delayed but indicative of complete obstruction of the airways. Postmortem lung observations showed extensive areas of atelectasis and edema. Additional dvta are needed on exposure of human subjects. Experiments must be performed so that both physiological methodology and aerosol technology are properly controlled. (Author abstract modified)

20738 APTIC NO. 38869

Antweiler, H. and F. Pott

RESULTS OF ANIMAL EXPERIMENTS ON THE EFFECT OF AIR CONTAMINATION WITH PARTICLES AND GASES. *(Tierexperimentelle Ergebnisse ueber die Wirkung partikel- und gasfoermiger Luftverunreinigungen). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg.: Abt. 1: Orig., Reihe B, 155(3):263-271, 1971. 30 refs. (Presented at the Anlass der Bad Godesberger Hygienetagung, 1971.)*

Animal experiments with sulfur dioxide, polycyclic aromatic hydrocarbons, and lead are reviewed. Numerous experiments with guinea pigs, which are most sensitive to SO2, revealed that exposure to SO2 concentrations of less than 52 mg/cu m has no acute toxic effect. However, man is five to ten times more sensitive toward SO2 than guinea pigs. Long-term exposure (up to 12 mo) to concentrations of up to 15 mg/sq m caused no chronic or cumulative effect with respect to respiratory function and blood. Body weight, growth rate, and life span were not influenced. Other experiments with guinea pigs revealed that the toxicity of SO2 could be greatly enhanced by combination with soluble particulate matter, which by itself was harmless. Such substances include certain manganese, iron and vanadium salts which may catalyze the oxidation of SO2 to sulfuric acid. It is quite difficult to simulate air pollution conditions for the determination of the effect of carcinogenic pollutants on animals. The best test in this respect, namely the exposure of laboratory animals in city areas with high pollution, could not to be carried out because it is too expensive. The predominant tool for testing the carcinogenic effect of air pollutants is presently the inhalation chamber. Rats exposed in such a chamber to benzo(a)pyrene aerosol over a period of 2 yrs developed lung carcinoma at a rate of two out of 21. Animal experiments with lead have revealed that 100% of the lead retained in the lung is resorbed, while only 5% of the lead ingested with the food is resorbed. Experiments with mice in a chamber into which automobile exhaust gases were blown revealed that at an average lead concentration of 2.6 micrograms/cu m a clearly increased lead deposition in the bone took place. In sheep, the lead stored in bones could be mobilized by antibiotics which lead to a sudden increase of the lead table in the blood. The few examples of animal experiments stress the importance of such tests parallel to epidemiological studies.

20739 APTIC NO. 38950

Bates, David V.

AIR POLLUTANTS AND THE HUMAN LUNG. *Am. Rev. Respirat. Disease, 105(1):1-11, Jan. 1972. 37 refs. (Presented at the University of Colorado, Denver, March 29, 1971 and at Stanford University, Palo Alto, Calif., April 1, 1971.)*

Epidemiologic data on chronic bronchitis and emphysema and on acute chest infections in children show that (1) episodes of increased sulfur dioxide and particulate pollution results in an increase in mortality among those with chronic lung diseases, and in some increase in morbidity; (2) annual SO2 concentrations greater than 0.08 ppm, particularly when accompanied by annual particulate pollution of more than 150 microgram/cu m, increase morbidity from chronic bronchitis in adults; (3) forced expiratory volume in one second in lower in male smokers in country towns than in smokers in cities; (4) there is a threefold increase in morbidity from lower chest infections in infants younger than two years in moderate and high pollution areas compared to very low pollution areas; and (5) an economic factor may be associated with differences in respiratory disease morbidity in children. Recent concepts of lung function and of pulmonary response to inhaled substances are discussed. Of particular relevance to epidemiologic studies is the evidence that the first site of the effect of smoke, and possibly of ambient pollutants, is in the small airways of the lung. Equally important is the evidence that particulates and gaseous pollutants lead to an increase of cells and macrophages in the lungs and, ultimately, to increased release of proteolytic enzymes in the lungs. Future research must consider the possible effects of pollution on the terminal bronchioles as well as on the major bronchi and alveoli.

20740 APTIC NO. 39517

Belobragina, G. V. and L. V. Pokrovskaya

PULMONARY CHANGES CAUSED BY EXPOSURE TO METALLIC FERROCHROME. *(Izmeneniya v legkikh ot vozdeystviya metallicheskogo ferrokhroma). Gigiena Truda i Prof. Zabolevaniya, no. 11:53-55, June 1967. 8 refs. Translated from Russian. 7p.*

A single intratracheal introduction of a chrome-iron alloy into white rats caused the pulmonary development of poorly formed cellular dust foci with slight fibrosis, catarrhal desquamative dust bronchitis, and bronchiolitis. Chronic deforming bronchi with numerous centers of bronchiectasia, marked hyperplasia of the peribronchial lymph nodes, emphysema, slowing progressing diffuse sclerotic changes, and sclerotic processes in the muscle layer of the vessels occurred subsequently. The nature of the changes occurring in the lungs with the introduction of the dust from the chrome-iron alloy is determined by the action of the chromium. The alloy contained 61.38% chromium, 1.2% silicon, and the remainder iron. Eighty-three percent of the particles were less than 5 micron in diameter and 2.4% were greater than 10 micron. (Author summary modified)

20741 APTIC NO. 39510

Bertrand, Gabriel and M. Macheboeuf

BIOCHEMISTRY - THE PRESENCE OF NICKEL AND COBALT IN ANIMALS. *(Chimie biologique - sur la presence du nickel et du cobalt chez lex animaux). C. R. Acad. Sci. (Paris), vol. 180:1380-1383, 1925. 3 refs. Translated from French. 7p.*

Nickel and cobalt concentration were determined in various organs of turkeys, chickens, Whiting and Smelt fish, silkworms, lobsters, mussels, clams, tunicata, humans, bulls, cows, calves, and mice. Extremely small quantities of nickel and even smaller quantities of cobalt were found in animal tissues. In man and in the higher animals, the liver is a relatively rich organ in nickel; keratinous tissues also contain a great deal of the metal. Aside from muscular and fatty tissues, nickel was found in every other part of the organism which was examined. The pancreas of the bull showed an unexpectedly high nickel content.

20742 APTIC NO. 39514

Bertrand, Gabriel and Hirosi Nakamura

RESEARCH ON THE PHYSIOLOGICAL IMPORTANCE OF NICKEL AND COBALT (1). *(Recherches sur l importance physiologique du nickel et du cobalt). Soc. Sci. Hyg. Aliment., vol. 24, 1936. 6 refs. Translated from French. 8p.*

Thirty-five mice from five litters were divided into two groups: one was fed a mixture of purified organic and inorganic materials and the other the same mixture with very small amounts of nickel and cobalt added. The average survival time of the mice fed without nickel and cobalt was 19.7 days, compared with an average 23.1 days for the mice receiving nickel and cobalt. A few hundredths of a milligram of these two metals is sufficient to increase the survival of the experimental animals by about 17%. Nickel and cobalt affect the aggregate of nutritive processes. Only a portion of the nickel and cobalt ingested was retained by the organism.

20743 APTIC NO. 39509

Bienvenu, Pierre, Claude Nofre, and Andre Cier

TOXICOLOGY - GENERAL COMPARATIVE TOXICOLOGY OF METALLIC IONS. RELATION TO THEIR PERIODIC CLASSIFICATION. *(Toxicologie - Toxicite generale comparee des ions metalliques. Relation avec la classification periodique). Acad. Sci. (Paris), vol. 256-1043-1044, Jan. 21, 1963. 10 refs. Translated from French. 4p.*

Acute toxicities of 42 cations were evaluated in terms of lethal dose following their intraperitoneal injection into mice. A periodicity in cation toxicity was observed as a function of atomic number. It seems possible to relate the periodic distribution of toxicities to the electronic structure of the elements.

20744 APTIC NO. 39220

Bouhuys, A., M. W. Dennis, and J. S. Douglas

HISTAMINE-INDUCED BRONCHOCONSTRICTION IN MAN AND GUINEA-PIG. *J. Physiol. (London), 200(1):64P-65P, 1969. 5 refs.*

Reversible and dose related decreases of dynamic compliance were observed in guinea pigs following administration of histamine by aerosol. Female guinea pigs were anesthetized with pentobarbital sodium, and a thin polyethylene catheter with two side holes to measure pleural pressure was placed in the chest and connected to a pressure transducer. The animals were placed in a body plethysmograph connected to a 5-liter bottle via a flowmeter with a pressure transducer recording air flow rate. Tidal volume was obtained from the pressure variations in the closed plethysmograph-bottle system, recorded with a third transducer. When the animal had recovered from the anesthesia, compliance and resistance were computed with an analog device, breath by breath, from the electrical signals representing tidal volume, air flow rate, and pleural pressure. Intraperitoneal injection of propranolol (10 mg/kg) increased sensitivity to inhaled histamine aerosols, while hexamethonium (4 mg/kg) caused decreased sensitivity 20-90 min after injection. In patients with bronchial asthma during clinical remission, hexamethonium had a similar effect on the response to inhaled histamine. The effect of hexamethonium can be explained by assuming a nicotinic action of histamine or by assuming an imbalance of vagal and sympathetic outflow such that hexamethonium reduces bronchomotor responses.

20745 APTIC NO. 39513

Bourasset, A. and G. Galland

CANCER OF THE RESPIRATORY TRACT AND EXPOSURE TO NICKEL SALTS. *(Cancer des voies* *respiratoires et exposition aux sels de nickel). Arch. Maladies Profess. Med. Trav. Securite Sociale (Paris), vol. 27:227-229, Jan.-Feb. 1966. Translated from French. 8p.*

Experimental pathology and personal observations are presented which illustrate the carcinogenic action of nickel powders. Published observations concerning cancers in the nickel industry relate either to the metallurgy of this metal or to its electrolytic refining. In the case described, the worker performed electrolytic nickel plating, and thus was exposed to vapors or to fine droplets of nickel salts. Unclean premises and inadequate ventilation favor the carcinogenic action of nickel.

20746 APTIC NO. 39679

Clemmesen, J. and A. Nielson

THE SOCIAL DISTRIBUTION OF CANCER IN COPENHAGEN, 1943 TO 1947. *Brit. J. Cancer (London), vol. 5:159-171, 1951. 13 refs.*

The incidence of various anatomic sites of cancer in Copenhagen residents for the years 1943 to 1947 was studied on the basis of the files of the Danish Cancer Registry. The statistical method is described. Cervical cancer shows a clean tendency to occur more often in the poorer classes both among married women and those never married. Female mammary cancer tends to decrease in frequency with marriage with no apparent distinction between social classes. Cancer of the lung in males also occurs more frequently at the lower social level.

20747 APTIC NO. 39622

Clemo, G. R. and E. W. Miller

THE CARCINOGENIC ACTION OF CITY SMOKE. *Chem. Ind. (London), 1955:38, Jan. 8, 1955. 1 ref.*

Three fractions from urban smoke and two isolated from diesel bus smoke were tested for carcinogenic action in mice. Two of the three city smoke fractions produced tumors in 12 to 29 tested animals in an average period of 9 mo, compared with benzopyrene which caused tumors in half the treated animals in from 4 to 6 mo. Results with diesel fractions were generally negative. The experiments indicate that city smoke has a marked carcinogenic action.

20748 APTIC NO. 39425

Colley, J. R. T. and D. D. Reid

URBAN AND SOCIAL ORIGINS OF CHILDHOOD BRONCHITIS IN ENGLAND AND WALES. *Brit. Med. J. (London), vol. 2:213-217, April 25, 1970. 15 refs.*

A survey of respiratory disease on over 10,000 children aged 6 to 10 years living in contrasting urban and rural areas of England and Wales showed pronounced social class gradient in the frequency of chronic cough, history of bronchitis, and also in disease of ears and nose. A consistent rise in the frequency of chest conditions with increasing local levels of air pollution was clearly seen only among the children of semi-skilled and unskilled workers. No such gradient was obvious for diseases of the ear and nose. These trends in chest disease in children paralleled similar trends in moral and disabling bronchitis among adults in the same areas. The excess rate for bronchitis in children and adults found in South Wales could not be accounted for by local levels of air pollution. (Author summary)

20749 APTIC NO. 39710

Conney, A. H.

PHARMACOLOGICAL IMPLICATIONS OF MICROSOMAL ENZYME INDUCTION. *Pharmacol. Rev., 19(3):317-366, 1967. 379 refs.*

Drugs, pesticides, herbicides, food additives, and environmental carcinogenic hydrocarbons stimulate their own metabolism or the metabolism of other compounds. Foreign chemicals probably exert this action by increasing the amount of drug metabolizing enzymes in liver microsomes. Treatment of animals or man with suitable inducers of liver microsomal enzymes accelerates drug metabolism in vivo and alters the duration and intensity of drug action. The stimulatory effect of drugs on their own metabolism often allows the organism to detoxify drugs more rapidly. This effect has considerable importance when it causes drugs to become less toxic and less effective during prolonged administration. However, if a metabolite has more activity than the parent drug, enzyme induction can enhance the drug s action. Enzyme induction may also be important during chronic exposure to environmental carcinogens, such as 3,4-benzopyrene. The ability of 3,4-benzopyrene to stimulate its own metabolism in liver, lung, gastrointestinal tract, and skin represents an important mechanism for the detoxification of this substance. Inducers of microsomal enzymes stimulate the metabolism or synthesis of several normal body substrates such as steroid hormones, pyridine nucleotides, cytochromes, and bilirubin. Inducers of liver microsomal enzymes also enhance the hydroxylation of steroids in man. Certain inducers of liver microsomal enzymes have recently been used therapeutically for the treatment of hyperbilirubinemia in jaundiced children and for the treatment of Cushing s syndrome. (Author summary modified)

20750 APTIC NO. 38721

Corn, Morton

DOSE TO THE RESPIRATORY TRACT FROM PERSONAL, OCCUPATIONAL AND COMMUNITY AIR POLLUTANTS. *Environ. Letters, 1(1):29-39, Jan. 1971. 8 refs. (Presented at the Pennsylvania Tuberculosis and Health Society, Annual Meeting, 78th, Pittsburgh, Pa., April 29, 1970.)*

The doses (concentration-time) to the respiratory tract by urban, occupational and personal pollutants were calculated by assuming the pollutant concentrations in air equivalent to air quality standards, threshold limit values, and reported cigarette smoke concentrations, respectively. Urban pollution includes carbon monoxide, nitrogen oxides, lead, hydrocarbons, smoke, ash, sulfur dioxide, sulfuric acid, fluorine, beryllium, cadmium oxides, zinc oxides, pollens, allergens, and particulate matter from automotive, domestic, industrial, and natural sources; occupational pollution consists of dusts, fumes, gases, organic dusts, and radioactive particles within industries. The most severe challenge by a large margin was that posed to the pack-a-day cigarette smoker. Assumptions and results of calculations are presented. (Author abstract modified)

20751 APTIC NO. 39497

Cristiani, H.

IS THERE FLUOROSIS OR FLUORINE CACHEXIA IN HUMANS? (Existe-t-il chez 1 homme une fluorose ou cachexie fluorique?). Text in French. Presse Med. (Paris), no. 53:833-834, July 13, 1926.

Problems of possible fluorosis and fluorine cachexia in humans are discussed. The amounts of fluorine entering the human organism under normal conditions are not capable of producing intoxication. Acute poisonings are of an accidental character. Fluorine containing products are, however, massively used as pesticides and preservative agents in different foodstufffs. Such fluorine may cause poisonings. The amount of fluorine entering the human organism (0.13-1.3 mg/kg) is too low to cause acute poisoning, but it can produce poisoning after a long period of time, the length of which has not yet been clarified. Very small doses are capable of causing lethal cachexia, which makes investigations, into the possible dangers necessary. According to an investigation, doses of about 2 cg/kg lead to lethal cachexia in animals. Due to the intense milk consumption, infants are most affected by fluorine hazards. Measures should be taken to prevent the abuse of fluorine compounds as preservatives.

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20752 APTIC NO. 39242

Deane, Margaret and John R. Goldsmith

HEALTH EFFECTS OF PULP MILL ODOR IN ANDERSON, CALIFORNIA. *Preprint, Environmental Protection Agency, Washington, D. C., 22p., 1971. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

A rural community in northern California was divided into three areas representing three levels of exposure to odors from a pulp mill. The areas were delineated by presumptive exposure based on proximity to the plant and location in relation to prevailing wind patterns and confirmed by chemical and organoleptic measurements. Systematic population samples were chosen to represent the three types of residential areas in the area and to yield approximately equal numbers of male and female respondents. Similar surveys were carried out using postal questionnaires and personal interview. Along with measurement of chronic health conditions, the frequency, recency, and attributed causes of a list of acute or transitory symptoms were determined. Background variables also included age, sex, marital status, employment, smoking habits, previous occupational exposure, and pre-existing medical conditions. Persistent cough and phlegm were several times as frequent in the area closest to the plant. No other factors to account for this difference were revealed. (Author abstract modified)

20753 APTIC NO. 39512

Dervillee, P., B. Quintard, Et. Dervillee, and M. Tardivel

EXPERIMENTAL STUDY OF THE ACTION OF POWDERED NICKEL INTRODUCED VIA THE DIGESTIVE TRACT. *(Etude experimentale sur l action du nickel pulverulent introduit par voie digestive). Arch. Maladies Profess. Med. Trav. Securite Sociale (Paris), vol. 25:247-248, April-May 1964. Translated from French. 4p.*

Acute poisoning may result from the ingestion of nickel and its salts. In industrial pathology, nickel dermatitides have been established, and nickel may also cause certain tumors, attacking in particular the nasal mucosae or the lungs. Groups of guinea pigs were given 10 mg to 1 g of nickel per kg of animal weight in order to determine the lethal dose. Behavior of the animals, length of life, hematologic variations, and the results of autopsies were studied. The action of nickel was also studied at sublethal doses in rabbits. The length of life of the guinea pigs varied inversely as a function of the ingested dose, indicating a lethal dose of about 5-25 mg/kg body weight. While the general condition of the exposed rabbits was excellent after seven months of experimentation, leucocytosis with lymphocytosis could be noted.

20754 APTIC NO. 39270

Dettori, Giuseppe

A PRACTICAL METHOD FOR CARBON MONOXIDE DETERMINATION IN BLOOD. *(Un metodo practico per il dosaggio dell ossido di carbonio nel sangue). Text in Italian. Rass. Med. Ind., 22(4-5):286-290, July-Oct. 1953*

A gas volumetric blood carbon monoxide determination method, based on the Drehschmidt-Hampel-Nicloux, and on the Abrest-Kohn- Truffert methods, which requires 5 cu cm blood and uses a single reagent, is described. The blood is extracted in an airtight glass apparatus in a vacuum by a reagent obtained by mixing 250 g ammonium chloride in 750 cu cm water with 200 g copper chloride. A copper spiral is added to the reagent when stored and 8 ccm ammonia are added before use. The reagent extracts CO from the blood in the form of gaseous carbon oxychloride which is measured by means of a mercury manometer system. The method is encumbered by an error of the order of + or 0.1 cu cm%. Acetylene and ethylene would interfere but this danger does not exist in the application under discussion.

20755 APTIC NO. 39246

Doll, Richard

BRONCHIAL CARCINOMA: INCIDENCE AND AETIOLOGY. *Brit. Med. J. (London), 1953:521-526, Sept. 5, 1953. (Presented at the Milroy Lectures, Royal College of Physicians, London, England, Feb. 10 and 12, 1953.)*

Mortality statistics were used to estimate the incidence of bronchial carcinoma in England. Of all male deaths in 1950 (London), 4% were attributed to lung cancer; at ages 45-54 the proportion was 10%. Evidence that lung cancer is becoming more fequent was derived from necropsy studies as well as from vital statistics and clinical series. Reasons for believing that there is a real increase include: (1) the increase in the recorded death rate continuous; (2) the disease is so common that, had the increase been spurious, it would be necessary to postulate that 50 years ago 95% of the fatal cases were wrongly certified; (3) necropsy examinations show considerable increases in the proportions of bronchial carcinomas to all cancer; (4) the increase is greater in men; (5) the age distribution of lung cancer in men is different from all other major types of male cancer; and (6) the death rates in town and country retained the same relation to one another. Possible factors responsible for the increase are atmospheric pollution with waste products from domestic chimney and factory smoke, the exhaust fumes of vehicles, dust from tarred roads, tobacco smoking, and the after-effects of certain respiratory infections. Animals experiments are briefly discussed. Important differences in incidence are noted between sections of the population within individual countries. The death rate from lung cancer in 1950 was twice as high among the male inhabitants of Greater London as among men living in rural districts. Occupational risks and the effect of sex are also discussed. ½

20756 APTIC NO. 39507

Duperrat, B. and J. -N. Lamberton

ALLERGY TO NICKEL (200 SKIN REACTIONS). *(Allergie au nickel (200 epidermo-reactions). Preprint, Societe de Dermatologie et Syphilographe (France), 1962. 7 refs. (Presented at the Societe de Dermatologie et Syphilographie, Paris, France, March 8, 1962.) Translated from French. 7p.*

A solution of 5 g nickel sulfate in 100 g distilled water was used in patch tests to determine the allergic effect of nickel on 100 men and women. In the male group, nickel caused 13 cases of dermatitis in nickel-platers, 1 wrist-watch dermatitis, and 4 positive reactions in cement-makers. In the nine positive observations in the group of women two occurred in nickel-platers, while one indicated an intolerance to external medication caused by cobalt. In tests of cement makers, cobalt also seems to have both a greater frequency of positive response and a greater intensity.

20757 APTIC NO. 39181

Faria, Aluizio

PRELIMINARY STUDY ON AIRBORNE FUNGI IN THE CITY OF BELO HORIZONTE, MINAS GERAIS. II. SKIN SENSITIVITY TO THE MOST COMMON GENERA IN PATIENTS WITH RESPIRATORY ALLERGY. *(Estudo preliminar sobre a flora micotica anemofila da cidade de Belo Horizonte, Minas Gerais. II. Sensibilidade cutanea aus 4 generos mais comuns em pacientes com alergia respiratoria). Text in Portuguese. Rev. Inst. Med. Trop. Sao Paulo, 9(4):208-212, July-Aug. 1967. 6 refs.*

A study was conducted on 50 patients with chronic respiratory allergy in order to determine the cutaneous sensibility to the 4 kinds of anemofilos growths most frequent in the atmosphere of the city of Belo Horizonte, Minas Gerais. Sixteen of the patients, or 32%, reacted to one or more of Hormodendrum, Penicillium, Aspergillus, and Pullaria fungus (mushrooms, growths). The largest number of positive skin reactions occurred with Penicillium, although the Hormodendrum is most common in Belo Horizonte. Approximately one-third of the patients tested reacted to the combination of all four kinds. There were no positive reactions to Hormodendrum and Pullaria alone. The results are compared with similar tests, and critical considerations on the probable causes of the dissimilarities encountered in the literature are given. Suggestions for a plan to systematically study the subject are presented.

20758 APTIC NO. 39511

Fidarov, A. A.

NICKEL AND COBALT CONTENT IN THE BLOOD SERUM OF PATIENTS WITH PSORIASIS. *(Soderzhaniye nikelya i kobal'ta v syvorotke krovi bol nykh psoriazom). Vestn. Dermatol. Venerol., vol. 42:46-48, Aug. 1968. 6 refs. Translated from Russian. 6p.*

The nickel and cobalt content in blood serum of healthy persons is quite variable among persons between 20 and 39 years of age. With an increase in age, both elements decrease somewhat. Observations of patients with psoriasis showed a lowered level of cobalt in the blood serum and an increased nickel content. Nickel and cobalt levels approached the norm as the health of the patients improved with treatment.

20759 APTIC NO. 39341

Frank, R., J. P. Flesch, and J. D. Brain

EFFECT OF OZONE ON ELASTIC BEHAVIOR OF EXCISED LUNGS OF DOGS. *Environ. Res., 1(4):343-354, Oct. 1971. 27 refs.*

The static, deflation volume-pressure behavior of excised paired lobes of dogs lungs before and after ventilation with either air or ozone was measured to determine the effect of ozone on elastic behavior of lungs in the absence of intraalveolar edema. The lobes exposed to ozone showed only a slight increase in recoiling force at intermediate and large volumes and a more rapid fall in dynamic compliance as compared with lobes exposed to air. Additional excised lobes exposed to air or ozone during ventilation were characterized by a large total volume, slow frequency (9-10 cycles/min) and end-expiratory collapse. Both groups showed similar impairment of alveolar stability and, following continuous inflation for several hours, similar degrees of recovery. The primary event leading to altered elastic behavior, therefore, was not the direct interaction between the gas ans surface-active or tissue elastic elements, but rather the occurrence of edema, unequally distributed or severe changes in airway flow resistance, or shifts in lung volume. (Author abstract modified)

20760 APTIC NO. 39177

Friberg, Lars

SUMMARY OF TECHNICAL PROBLEMS. *Preprint, Environmental Protection Agency, Washington, D.C., 11p., 1971. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Problems concerning the dose-response relationship of odor evaluation are summarized. The most common adverse effect of odorous substances are annoyance reactions. Very few studies, however, have been undertaken to evaluate the effect of long-term exposure to odors on chronic diseases. Studies on specific medical effects of exposure are also needed. Annoyance reactions, however, are sufficient evidence for the taking of administrative action for odor abatement. With regard to dose, the hedonic aspects of odors as well as intensity above threshold are important. The frequency of odor is another factor for consideration. Measurement and analytical methods for these determinations are presented.

20761 APTIC NO. 39261

Frick, J. W.

THE COUNTY-WIDE SURVEY OF 1956. *In: Studies of Eye Irritation due to Los Angeles Smog 1954-1956. Air Pollution Foundation, San Marino, Calif., p. 118-170, July 1, 1957. 84 refs.*

The general plan of the 1956 survey was to select panels of volunteer reporters in the neighborhood of the aerometric stations, and have them report when requested on specially prepared forms indicating degree of nose, throat, and eye irritation they had experienced on a given day, together with the time when irritation was felt to be at a peak. The data thus secured were to be reduced and furnished to the Los Angeles Air Pollution Control District for statistical analysis and relation to types of air pollutants. In addition, before irritation reports were requested, individuals were to be asked to complete a questionnaire which contained items of a physical, psychological, and attitudinal nature which could be related to each other and to degrees of irritation reported by the individual reporters. Each of the following questionnaire variables is discussed with respect to their interrelationships with the others: age, sex, smoking, respiratory symptoms, eye blinking, eye color, and temperature.

20762 APTIC NO. 38717

Friedrichs, K. H., W. Hilscher, and S. Sethi

STUDY OF TISSUE REACTION AND FIBERS DISTRIBUTION IN ABDOMINAL GRANULOMAS AND LYMPH NODES OF THE RAT FOLLOWING INTRAPERITONEAL ADMINISTRATION OF VARIOUS AMPHIBOLES. *(Staub- und Gewebeuntersuchungen an Ratten nach intraperitonealer Injektion von Asbest). Text in German. Int. Arch. Arbeitsmed., vol. 28:341-354, 1971. 4 refs.*

Tissue reaction and fiber distribution in rats injected intraperitoneally with 5 doses of 20 mg each of standard amosite, anthophyllite, and crocidolite asbestos at one week intervals were studied. Histological examinations of 5-micron sections of abdominal granulomas and the related lymph nodes revealed that the granulomas contained fibers of different lengths. Of these, the short fibers were almost always interacellular, whereas the longer ones were seldom incorporated by the cells. Conversely, the lymph node deposits of short fibers developed without any fibrosis in the region. Comparison of fiber length distribution curves from original dusts and the dusts deposited in the tissues established that the transport of the fibers from the site of administration depended upon their lengths. Transport began with the fibers under 20 micron and increased with decreasing fiber length.

20763 APTIC NO. 39013

Funabashi, Shigeru, Tatsuya Hayashi, Toshiyuki Nishimuta, Nobukiyo Sakurai, Touru Takayama, Masaru Mizoguchi, Keiji Kishimoto, Yoshiko Muramatsu, Ryotara Tochigi, Yoshio Takayama, Katsumi Yamada, Akira Sato, Yukiha Ri, Amane Terajima, Junichi Ito, Misako Murata, Tsuyoshi Toba, Suzuko Uehara, Seiji Kubo, Masao Muramatsu, Koji Ito, Motoaki Adachi, Ken Motomiya, and Ryo Yoshida

RELATIONSHIP BETWEEN AIR POLLUTION AND INFANT BRONCHIAL ASTHMA, REPORT 3. AMOUNT OF SERO-IMMUNE GLOBULIN (GAMMA G, GAMMA A, GAMMA M, GAMMA E) OF ASTHMATIC CHILDREN OF POLLUTED AREA. *(Taikiosen to shoni kikanshi zensoku, Sono 3. Osen-chiku zensokuji no kessei meneki gurobulin (gamma G, gamma A, gamma M, gamma E) ryo). Text in Japanese. Shonika Shinryo (J. Pediat. Pract.), 35(4):460-464, April 1972. 39 refs.*

Comparative studies were made of the measured sero-immune globulins (Ig) of asthmatic children of the highly polluted area and the low polluted area of Fuji city, where the main industry is paper production. The asthmatic children were among the outpatients of the pediatrics department in Chiba University, and nonrallergic children were used for control. The determinations were done using the immunoplate made by H. Company for gamma G, gamma A, and Gamma M, and the indirect single radial immunodiffusion method for gamma E. There were no specific changes in amounts of gamma G of the outpatient children, but children of both polluted areas showed less gamma G than the others. The amounts of gamma A of children of both highly and low polluted areas approximated those of the control children but those of the outpatient children showed a tendency toward greater amounts when onsets of asthma occurred. The defect of gamma A was noted in a case of the low polluted area. There were no differences in the amount of gamma M among all groups. The significant difference in gamma E was noted between control children and the others, and the increase of gamma E was observed in about half of the children living in polluted areas, regardless of the degree pollution. However, the positive reactions were low with skin tests using commercial inhalation antigens. The total amount of Ig (gamma G, gamma A, and gamma M) was the smallest in asthmatic children of the highly polluted area in proportion to gamma G amounts.

20764 APTIC NO. 39324

Ghipponi, P., J. Darrigol, R. Skalova, and B. Cvjetanovic

STUDY OF BACTERIAL AIR POLLUTION IN AN ARID REGION OF AFRICA AFFECTED BY CEREBROSPINAL MENINGITIS. *Bull. World Health Organ. (Geneva), vol. 45:95-101, 1971. 6 refs.*

The prevalence of airborne bacteria in different types of rural and urban dwellings was studied in Upper Volta and in Mali in 1968 and 1969 to determine the relationship between bacterial air pollution and the spread of cerebrospinal meningitis. Air samples were taken at 26 dwellings in Upper Volta during the dry season and at 25 dwellings during the wet season. The total number of airborne bacteria, including those of oral origin, was three to five times higher during the dry season, when epidemics of cerebrospinal meningitis occur. Fewer bacteria were found in dwellings with ventilation and cement floors. The study in Mali was carried out during an epidemic of the disease and included 10 houses in the district of Bamako most affected by the epidemic and six houses in the least affected district. The incidence of airborne bacteria was 10 times higher in the first district and in proportion to the incidence of meningitis. The houses in this district were more crowded than in the second district and most had floors of beaten earth and straw roofs. These findings show that the incidence of airborne bacteria in African homes represents a useful index for determining the relative danger of transmission of cerebrospinal meningitis.

20765 APTIC NO 39147

Gilson, J. C.

HEALTH HAZARDS OF ASBESTOS. *Composites, 3(2):57-59, March 1972. 15 refs.*

Health hazards due to exposure to asbestos are reviewed with respect to historical background, diseases, biological effects, asbestos types, sources, and the comparison of occupational risks. The risk from asbestos is generally limited to inhalation of the fibers, causing asbestosis, lung cancer, and mesothelioma. The only other specific injury is the formation of asbestos corns on the fingers when the fibers lodge in the skin. Fiber dimensions usually associated with inhalation hazard are a length ranging within 5-100 micron and a diameter of about 2 micron. Asbestosis and bronchial cancers can be caused by all types of commercially used asbestos, including amosite, anthophyllite, chrysotile, and crocidolite, but the risk from chrysotile may be less than with the other types. The risk of developing mesothelioma is probably highest with crocidolite and lowest with chrysotile. The risk of health hazard is lowest in mining and increases in the fiber separating and manufacturing processes.

20766 APTIC NO. 39192

Gostinsky, V. D.

THE TOXICITY OF ISOPRENE AND THE MAXIMUM PERMISSIBLE CONCENTRATION OF ITS VAPOURS IN THE ATMOSPHERE OF INDUSTRIAL PREMISES. *(O toksichnosti izoprena i predelno dopustimoy kontsentratsii ego parov v vozdukhe rabochikh pomeshcheniy). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 9(1):36-42, 1965. 10 refs.*

The toxicity of isoprene was investigated under single and long-term exposure to its vapors. For 50% of the albino mice with 2 hr exposures, the narcotic concentration of isoprene vapors was 109 mg/1; the lethal concentration was 144 mg/1. Concentrations of 0.75-8.0 mg/1 produced detectable changes in the condition of the central nervous system of mice and rabbits when inhaled for 40 min. The irritating action of the vapors on the mucosa of human volunteers was seen at one mix exposures to 0.16 mg/1. Similar effects were observed for 0.5 mg/1 of 1,3-butadiene. Following a four to five-month aspiration of 2.2-4.9 mg/1 isoprene, albino mice, rats, and rabbits exhibited authentic changes in the functional state of the central and vegetative nervous system, as well as changes in work capacity and gas exchange values. Some alterations in the peripheral blood were also demonstratable. The most substantial changes revealed by pathohistological examination were in respiratory passages. Based on these findings, the maximum permissible concentration of isoprene in industrial atmospheres should be 0.04 mg/1.

20767 APTIC NO. 39508

Goto, Masayasu and Kentaro Higuchi

THE DERMATOLOGICAL SYMPTOMATOLOGY OF OIL DISEASE. (CHLORINATED BIPHENYL POISONING). *(Yusho (Enka bifueniru chudokusho) no hifukagakuteki shokoron). Fukuoka Igaku Zasshi (Fukuoka Acta Med.), vol. 60:409-431, 1969. 25 refs. Translated from Japanese. 56p.*

The symptomatology of dermatologic disease due to chlorinated biphenyl poisoning is elucidated through clinical and laboratory investigation of 138 patients. The particular brand of rice oil involved in these cases is manufactured by a process which includes extraction from rice bran with hexene, deproteinizing, deoxidizing, dewaxing, decoloring, deodorizing, cooling, and filtering. Most of the oil used by the patients was manufactured on three days, and 1900-2000 ppm of Kanechlor 400, primarily cetrachlorobiphenyl, was detected in this oil. The quantity of oil used was stated to be 1.8 liters per family per month, and the oil used by the patients contained more than 10 times the quantity of peroxide than recently marketed oil. Many of the patients complained of swelling of the upper eyelids, an increase in eye discharge, anorexia, a loss of strength in the four limbs, edema in the arms and legs, discomfort, vomiting, pain in the joints, pigmentation of the lips, and other symptoms. Various kinds of skin disease were observed, manifested by chloracne associated with follicular keratosis. Ophthalmic and dermatologic findings are discussed. Skin changes seemed to be due to hyperkeratinization associated with abnormal lipid metabolism. Increased serum alkaline phosphatase was observed, with increased serum glutamic oxaloacetic transaminase and serum glutamic pyruvic transaminase in very severe cases. The relation between age and outbreak of the disease is considered.

20768 APTIC NO. 38811

Gregory, James

THE INFLUENCE OF CLIMATE AND ATMOSPHERIC POLLUTION ON EXACERBATIONS OF CHRONIC BRONCHITIS. *Atmos. Environ., 4(5):453-468, Sept. 1970. 17 refs. (Includes discussion by W. W. Holland, ibid, 5(4):435- 436, June 1971. 2 refs.*

The rate of absenteeism due to exacerbations of respiratory disease for 340 cases of chronic bronchitis among male employees of a steel plant was surveyed retrospectively and compared with climatic factors and an air pollution index over a 6-year period. Monthly average figures for temperature, smoke, and sulfur dioxide correlated with sickness rates, but the correlations with air pollution were influenced by the dependence of smoke and SO2 on the temperature itself, which appeared as the dominant factor. Based on weekly averages over the worst winter, the temperature correlated inversely with the prevalence rate of the following week, and both maximum and mean smoke pollution levels correlated with the incidence rate of the succeeding week. Smoke pollution, therefore, was established as a factor in the exacerbation of chronic bronchitis. Temperature may be more concerned with the return to work of those patients already absent due to sickness. (Author abstract modified)

20769 APTIC NO. 39463

Gregory, Philip H.

ALLERGENS AS A CAUSE OF RESPIRATORY DISEASE. *Chest and Heart Assoc., London (England), Hum. Environ. Respir, Syst., Proc., London, England, 1970, p.64-69. 9 refs. (Oct. 20.)*

Various types of airborne allergens and their properties are reviewed with regard to respiratory diseases. An automatic volumetric spore trap for sampling and determination of the respiratory allergens in ambient air is described. The outdoor respiratory allergens include spores of cladosporium, smuts, alternaria, epicococcum, nettle, sporobolomycetes, mushrooms, toadstools, leptospheria, and aspergillus fumigatus. Concentration and health effects vary with season and are affected by rain, wind, and time of day. The indoor allergens are house dust mite, merulius lacrymans, cut flowers, dogs, cats, and cage birds. Spores of micropolyspora faeni with thermoactinomyces vulgaris found in west country barns are also considered. Only some of the air spora are allergens. Each particle species has a characteristic diameter and size which determines the kind of respiratory chosen for protection. Some aids for alleviating the ill effects of allergies and allergen control methods are considered.

20770 APTIC NO. 39515

Guliy, M. F. and V. V. Sushkova

EFFECT OF SODIUM BICARBONATE, MG(2+), MN(2+) AND ZN(2+) ON INCORPORATION OF C(14) FROM RADIOACTIVE ACETATE INTO PROTEINS, LIPIDS, GLYCOGEN OF THE LIVER AND INTO PROTEINS OF BLOOD SERUM IN CHICKENS OF DIFFERENT AGE. *(Vpliv bikarbonatu natriyu, Mg(2+), Mn(2+) i Zn(2+) na vklyuchyennya C(14) z radioaktivnogo atsetatu v bilki, lipidi y glikogen pechinki ta v bilki sirovatki krovi u kurey riznogo viku). Ukr. Biokhim. Zh., no. 4:484-488, 1970. 18 refs. Translated from Ukrainian. 8p.*

The effect of a mixture of sodium bicarbonate, magnesium, manganese, and zinc sulfates with water on the incorporation of carbon-14 from radioactive acetate into proteins, lipids, liver glycogen, and blood serum proteins was studied in roosters aged 1, 3,6, and 18 mo. Stimulation of the carbon dioxide fixation processes intensifies the metabolic processes and causes more rapid isotope label elimination in birds fed on the salt mixture. The difference between specific radioactivity of the albumins, lipids, liver glycogen, and albumins of the blood serum increased with the age of the chickens.

20771 APTIC NO. 39179

Hammer, Douglas I., John F. Finklea, Russell H. Hendricks, Thomas A. Hinners, Wilson B. Riggan, and Carl M. Shy

TRACE METALS IN HUMAN HAIR AS A SIMPLE EPIDEMIOLOGIC MONITOR OF ENVIRONMENTAL EXPOSURE. *Preprint, Missouri Univ., Columbia, 22p., 1972. 29 refs. (Presented at the Conference on Trace Substances in Environmental Health, Annual, 5th, Columbia, Mo., June 29-July 1, 1971.)*

Scalp hair metal levels were previously shown to reflect environmental exposure gradients for arsenic (As), cadmium (Cd), and lead (Pb) in non-occupationally exposed schoolboys. Four problems were studied to explore further the epidemiologic utility of hair as a practical monitoring tool. First, a simple mathematical model was constructed to consider explicitly the multiple determinants of a measured hair trace metal level. Second, pre-analysis hair wash procedures suggested that detergent, alcohol, and distilled water, but not EDTA, wash rinses were sufficient. Third, hair trace metal levels of As, Cd, copper, Pb, and zinc were found to be temporarily consistent within individuals and over the exposure gradient. Fourth, hair and blood Pb levels correlated well (r equals 0.46), indicating that hair Pb reflects endogenous Pb absorption in addition to any exogenous deposition. Current human environmental Pb exposure is a function of fallout as well as airborne Pb. Increased Pb absorption most probably occurs by both respiratory and gastrointestinal routes. Future epidemiologic studies can no longer neglect dust fall metals when estimating environmental exposure. (Author abstract modified)

20772 APTIC NO. 39095

Hankin, Lester

LEAD POISONING - A DISEASE OF OUR TIME. *J. Milk Food Technol., 35(2):86-97, Feb. 1972. 128 refs.*

The lead poisoning problem among children is examined in detail with respect to the biochemical aspects, sources of lead contamination, body burden of lead, testing, and treatment. The outward signs of lead poisoning range listlessness and abdominal pain to vomiting to mental retardation. The sources of lead contamination include air pollution, i.e., lead emissions attributed primarily to automobile exhaust fumes; natural emissions of silicate dusts, volcanic halogen aerosols, forest fire smoke, aerosol sea salts, and meteoritic smoke; food contaminated by lead fallout on crops and pasture, accidental uptake by animals, and uptake by plants from soil and from effluents used in irrigation materials; growing crops contaminated by automotive exhausts; dust fallout from mining operations, and sewage sludge application to soils; water poisoned by natural contamination, fallout from auto and industrial pollution, and lead piping; containers containing lead in their makeup; soils; and paints containing lead and ingested by children. Some laboratory criteria for the diagnosis of lead poisoning are lead content in blood, x-rays of gastrointestinal tracts or bones, elevated urine level, basophilic stippling of red blood cells, and determination of delta-aminolevulinic acid in urine. Once diagnosed, the victims of lead poisoning may be treated by chelation therapy.

20773 APTIC NO. 39665

Herrington, L. P.

NEGLECTED AREAS OF INVESTIGATION IN THE PROBLEM OF CHEMICALLY CONTAMINATED FOGS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 493-498. (May 3-5, Louis C. McCabe, ed.)*

Three specific problem areas in relation to chemically contaminated fogs are presented. The first area concerns the neglected aspect of human respiratory illness. It covers the study of the extraodinary reflex leverage associated with any stimulus which interferes with the system. An answer is needed to the question of cumulative or associative chemical insult effects. We need more investigation directed at the constitution of the polluted atmosphere itself. A better and more complete description of the reaction history of chemically polluted suspensions of liquid condensates in fog and smoke should be emphasized. We have the possibility that the irritant action or resulting compounds may not be entirely predictable from their mass incidence, but may bear a substantial relation to surface concentrations when adsorbed on particulate matter of varying degrees of fineness.

20774 **APTIC NO. 39413**

Hoffmann, Dietrich and Ernest L. Wynder

STUDIES ON GASOLINE ENGINE EXHAUST. *J. Air Pollution Control Assoc., 13(7):322-327, July 1963. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 55th, Chicago, Ill., May 20-24, 1962.)*

Results of the chemical analysis of exhaust gas of a gasoline engine under city driving schedule and road load are presented. Various carcinogenic and noncarcinogenic hydrocarbons, as well as phenols and nitro compounds, were isolated and identified. A benzene extract of the exhaust gas particulate phase was applied to the skin mice three times weekly in 50-, 33-, 25-, 10-, and 5% concentrations in acetone. After 35 wks 50% of the mice painted with 50% tar solution developed papillary tumors. The same results were obtained with the 33% tar mice after 57 wks, the 25% solution after 60 wks, and the 10% solution after 75 wks. During 1 yr a mouse painted with 25% acetone solution received about 5.0 g tar. These 5.0 g were isolated from about a 52-minute standard run, or 2100 cu ft of exhaust gas. In general, the exhaust gas is diluted up to 4000 times and is often exposed to sunlight and other secondary reactions before it comes into contact with the human lung. Therefore, caution must be used when interpreting these findings in respect to their effect on man.

20775 **APTIC NO. 39490**

Hoffmann, D., E. Theisz, and E. L. Wynder

STUDIES ON THE CARCINOGENICITY OF GASOLINE EXHAUST. *J. Air Pollution Control Assoc., 15(4):162-165, April 1965. 12 refs.*

Experiments were conducted which demonstrated that gasoline engine exhaust tar is carcinogenic in mice. The activity of exhaust tars is to a major extent due to the presence of four, five, and six ring condensed aromatic hydrocarbons. This concept was confirmed by large-scale separations and mouse skin tests of four main fractions and five subfractions of the neutral portions of exhaust tar and by comparison with the activity of the whole tar. The emission of polynuclear aromatic hydrocarbons and phenols in gasoline engine exhaust depends on the fuel used. Other methods for the reduction of these agents in gasoline engine exhaust are discussed. Used crankcase oil and blowby tar were biologically inactive. (Author summary modified)

20776 **APTIC NO. 39464**

Holland, Walter W. and Catherine W. Watson

AIR POLLUTION - A WORLD PROBLEM. *Chest and Heart Assoc., London (England), Hum. Environ. Respir. Syst., Proc., London, England, 1970, p. 11-24. 31 refs. (Oct. 20.)*

The health effects of air pollution are reviewed. Prolonged exposure to urban air pollution appears to be a contributory factor in the development of respiratory disease. Repeated exposure to increased levels of pollution results in an excerbation of symptoms among cigarette smokers and among those with existing respiratory disease and can also produce irritating side-effects in healthy individuals. Severe smog episodes can result in increased mortality among the old or chronically sick. Pollution is a problem accompanying urbanization and industrialization, and it is essential to institute effective measures before either the acute or chronic effects become overwhelming. (Author conclusions modified)

20777 **APTIC NO. 39068**

Islam, M. S. and W. T. Ulmer

MECHANICS OF BREATHING: AIRWAY FLOW RESISTANCE IN PATIENTS WITH CHRONIC OBSTRUCTION. *(Atemmechanische Untersuchungen zur Frage der Ventilationsbehinderung bei Patienten mit chronisch obstruktiver Atemwegserkrankung). Text in German. Pneumonol. (Berlin), 146(2):126-139, Oct. 1971. 39 refs.*

Airflow, intrathoracic gas volume, and alveolar and esophageal pressure during maximum possible expiration after normal and deep inspiration were determined in 21 subjects of different ages, both with and without airway obstruction. Differences between healthy subjects with acetylcholine-induced airway obstruction and in patients with chronic airway obstruction were very small; possibly, these differences were due to general destructive changes of the lung parenchyma. The increase of airway flow resistance, the decrease of lung volume, and the increase of esophageal pressure were more marked and earlier in patients with airway obstruction than in healthy subjects. Flow-resistance forces in airways are dependent on intrapleural-and alveolar- pressure, on lung volume, and on the tension of the bronchial musculature, in which the bronchial muscle tension and lung volume play a more prominent role. Airway flow resistance is controlled by the balance between the volume dependent, alveolar and intrapleural pressure, and bronchial muscle tension. The tendency toward total closing of the airways with the decrease of lung volume during deep expiration is dependent on the tension of the bronchial musculature and the volume of the lung. (Author abstract modified)

20778 **APTIC NO. 39006**

Izmerov, N. F.

SOME BIOLOGICAL ASPECTS OF ATMOSPHERIC CONTAMINATION. *(Algunos aspectos biologicos de la contaminacion atmosferica). Text in Spanish. Saneamiento, 34(217):100-106, 125, 1970. 20 refs.*

The World Health Organization (WHO), the health problems posed by air pollution, and pertinent research in this field are discussed. The scope of WHO s interests is indicated by its definition of health as the state of total physical, mental, and social well-being, not merely the absence of affections and infirmities. Since 1950, the WHO has been concerned with the monitoring and control of atmospheric contaminants, with their epidemiological effects, with the genetic effects of ionizing radiation and chemical mutagens, and with anti-pollution legislation. It has sponsored agencies for systematic collection and dissemination of information regarding world-wide air pollution research and anti-pollution measures. In 1963 a WHO Symposium on Criteria for Determination of Purity of Air defined four categories of impurity concentrations, exposure durations, and corresponding biological reactions to provide an objective basis for anti-pollution legislation. The most important one of these specifies that the concentrations and durations are not to exceed the limits at which no direct or indirect physiological effects, including changes of the reflexes and adaptive or protective reactions, are observable by currently available methods. Experimental studies showed that, contrary to early views, on the time scale of interest, adaptation is negligible and that many short-term protective reactions to contaminants become pathological on longer exposure. Russian research in this field is based largely on I. P. Pavlov s views of a homeostatic interaction of a living organism with its physical and chemical environment, in which its sensory receptors and central nervous system play an essential role. The importance of indirect effects of air pollution on man s well-being are mentioned.

20779 **APTIC NO. 39157**

Kandus, J.

DIFFERENCES IN THE DEVELOPMENT OF SILICOSIS IN FEMALE AND MALE WORKERS EXPOSED TO THE SAME DUST CONDITIONS. *(Ueber die unterschiedliche 3ilikoseentwicklung bei weiblichen und maennlichen Personen mit gleicher Staubexposition). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 21(6):176-179, June 1971. 13 refs.*

The development of silicosis in workers exposed to the same dust conditions in a steel and iron works was investigated. Significant differences between men and women with regard to the time before the onset of silicosis and the evolution of the disease were determined. The lower the age of women when starting work, the more frequent was early silicosis; when the women affected were transferred to other work, the disease showed no further worsening. In the case of men, the onset and period of development of silicosis were both affected only by the length of exposure; the silicosis continued to worsen even after exposure to dust had ended.

20780 APTIC NO. 39774

Karpov, A. P.

AN ELECTROPHYSICAL ANALYSIS OF THE ACTION OF CERTAIN CHEMICAL SUBSTANCES ON OLFACTORY NERVOUS STRUCTURES IN HYGENIC STANDARDIZATION OF ATMOSPHERIC POLLUTIONS. *Text in Russian. Gigiena i Sanit., 37(2):4-10, 1972. 3 refs.*

Approximately the same concentrations of substances produced changes in the activity of the olfactory bulb neurons, the central and the cortico-medial nuclei of amygdala, and an electroencephalographic activation reaction; acetone at a concentration of 0.2-0.5 mg/cu m, benzol at 2 mg/cu m, and ammonium at 1 mg/cu m. However, the specific reaction of olfactory structures under the action of an olfactory irritant takes place with acetone concentration of 2 mg/cu m, that of benzol at 3.3 mg/cu m, and ammonium at 1.8 mg/cu m. A method of comparative analysis of the total electric activity of various parts of cerebrum of the neuronic activity of the olfactory organ, and of the vegetative indices may be used for investigating the mechanism of action of atmospheric pollutions on the human body.

20781 APTIC NO. 39231

Kendall, David A. and Stanley P. Jacobs

PHYSIOLOGICAL RESPONSES TO ODORANTS. *Preprint, Environmental Protection Agency, Washington, D. C., 28p., 1971. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Experiments were conducted to determine which physiologic parameters, if any, correlate with detection of odor and whether these responses change as the concentration or duration of stimulus is changed. The presentation of the stimulus was on a completely blind basis, with no suggestions for smelling made to the subjects. Test chamber design; equipment and procedures for sample presentation and monitoring of the autonomic responses; and the results of orientation trials with both expert and untrained observers are described. Preliminary studies used relatively volatile odorants such as ethyl mercaptan, methyl ibosutyl ketone, and carbon disulfide. Changes in heart rate, respiration, peripheral blood flow, and palmar sweating were measured. Overt reactions including sniffing, facial movements, actual frowning, and indications of simple awareness of odor were apparent when the odor concentrations were substantially above the minimum detectable level. Preliminary findings on verbal and physiological responses are presented.

20782 APTIC NO. 39121

Klement, R. F.

APPLICATION OF LIMITING VALUES IN ANALYSIS OF SPIROGRAPHIC MATERIAL. *Work Environ. Health, 8(3):74-80, 1972. 9 refs.*

Several different spirographic tests were used in studying the respiratory organs of healthy subjects, and a system of limiting indices was theoretically substantiated by mathematical formulation. The system is based on a formula which determines the rate of pulmonary clearance during a single forced breathing cycle. In the group studied, mean values and confidence limits of the indices were fixed and their correlations with generally accepted spirographic indices were analyzed. A tight connection between limiting pulmonary clearance (LPCl) and the most important spirographic indices, i.e., total capacity, inspiratory capacity, functional residual capacity, vital capacity, forced vital capacity, and maximum breathing capacity, was established. The LPCl, therefore, is highly informative as an integral spirographic index which characterizes the state of mechanics of breathing as a whole, and allows the evaluation of the state of the lungs and airways with respect to their ability to interchange gases between alveolar space and the atmosphere in the regime of forced breathing. The method may be applied both in clinical physiology and in the field of occupational health, where industrial lung disease is a common problem. (Author abstract modified)

20783 APTIC NO. 39618

Kochanov, M. M.

CONCERNING TOXICITY OF ETHYLENE TRIFLUORIDE. *(O toksichnosti triftoretilena). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, vol. 8:21-26, Oct. 1964. 17 refs.*

The toxicity and effect on human health of ethylene trifluoride were investigated. Exposure to the substance over a period of 2 hrs produced only a weak narcotic effect. Artificial oxidation of ethylene trifluoride intensified the toxic action, however, probably due to the formation of poisonous products after the reaction with oxygen and subsequent hydrolysis of peroxides. Based on studies of prolonged exposure, chemical transformations of the substance depended not only on the quantitative proportions of the product and oxygen, but also on the time of contact with the atmosphere. Distinct functions and pathohistological changes resulting from prolonged inhalation of ethylene trifluoride in low concentrations suggested the possibility of chronic intoxications. For more accurate data, the degree of atmospheric contamination with fluorine hydride and the actual quantity of the basic product during the synthesis and use of ethylene trifluoride must be considered.

20784 APTIC NO. 39274

Kotin, Paul and Hans L. Falk

THE EXPERIMENTAL INDUCTION OF PULMONARY TUMORS IN STRAIN-A MICE AFTER THEIR EXPOSURE TO AN ATMOSPHERE OF OZONIZED GASOLINE. *Cancer (Philadelphia), vol. 9:910-917, 1956. 24 refs.*

Three hundred and fifty strain-A mice were exposed to a synthetic smog (ozonized gasoline) for 52 weeks; an additional 350 mice were exposed to a washed-air control environment. After 40 weeks of exposure, 21% of the control mice were tumor-bearing compared to 31% of the test mice. The ratio of multiple-tumor-bearing mice at this time was 1.1% for the controls and 31% for the test animals. At the end of 52 weeks, the percentage of tumor-bearing mice in the control chamber was 41% compared with 80% in the test chamber. At this time, 10.3% of the controls had multiple tumors compared with 48.6% in the test chamber. The consistent narrowing of the difference between tumor-bearing animals and multiple-tumor-bearing animals is indicative of the increasing relative potency of the inbred tendency to pulmonary-tumor production in strain-A control mice. In other words, the carcinogenic properties of the test-chamber atmosphere at the 52nd week were less able to maintain the difference in the exaggerated incidence of tumor-bearing and multiple-tumor-bearing animals. That the test chamber contained no polycyclic hydrocarbons establishes the innate tumorigenic powers of the chemical substances that were present, i.e., diepoxides and peroxides. The test mice also weighed less than the control mice.

20785 APTIC NO. 39417

Kotin, Paul and Hans L. Falk

ORGANIC PEROXIDES, HYDROGEN PEROXIDE, EPOXIDES, AND NEOPLASIA. *Radiat. Res. Suppl., vol. 3:192-211, 1963. 50 refs.*

On the assumption that organic peroxides are produced after exposure to ionizing radiation, a broad spectrum of these compounds were bioassayed to determine their carcinogenicity. Preliminary data are reported supporting the suspicion that organic peroxides may possess carcinogenic properties. This suspicion relates to the acknowledged mutagenicity of certain peroxides. Peroxides may act by catalytzing the depolymerization of deoxyribonucleic (DNA) and ribonucleic acid (RNA). This radiomimetric property may provide a fundamental bridge between the carcinogenicity of ionizing radiation and that of organic peroxides when used in pure form. The carcinogenic properties of epoxides were also studied because organic peroxides may lead to the formation of epoxides, and because the established carcinogenicity of expoxides has resulted in large body of information relating to the mechanism of their action. Of particular significance in this area is their capability of acting as crosslinking agents. The possibility of utilizing the established carcinolytic properties of certain carcinogenic agents must be considered in the study of carcinogenic properties of organic peroxides. Bishydroxymethyl peroxide is an example of a compound possessing carcinolytic activity in need of bioassay for carcinogenicity. (Author summary modified)

20786 **APTIC NO. 39141**

Lebowitz, M. D., Eric J. Cassell, and James R. McCarroll

HEALTH AND THE URBAN ENVIRONMENT. XVI. AN ATTEMPT TO PREDICT THE INCIDENCE OF COMMON COLD IN A HEALTHY URBAN POPULATION FROM THE VARIATION IN AIR POLLUTION AND METEOROLOGY. *Environ. Letters, 3(1):25-32, 1972. 11 refs.*

An attempt was made to predict and explain common cold incidence in a healthy urban population in the Manhattan district of New York City based on air pollution and weather data. The environmental indices were ambient air levels of particulate matter, carbon monoxide, and sulfur dioxide, inversion conditions, barometric pressure, temperature, relative humidity, wind speed, precipitation, solar radiation, and sky cover on seasonal, average, hourly, maximum, minimum, and daily change bases. The results, although statistically significant, had higher explanatory than predictive value and underscored the need for multivariable analyses to consistently demonstrate a relationship between air pollution, weather, and cold symptoms.

20787 **APTIC NO. 39020**

Lende Van der, R. and N. G. M. Orie

VARIOUS ASPECTS OF INTERNATIONAL EPIDEMIOLOGICAL INVESTIGATION OF CNSLD. *TNO Nieuws, 26(11):541-546, Nov. 1971. 28 refs.*

The aetiology of chronic non-specific lung diseases is briefly reviewed with respect to methods of epidemiological investigations, international standardization of interviews and research, and comparisons of results. On of the most important methods of investigation is the comparison of prevalence rates or populations which have a large number of common characteristics but which differ with regard to the characteristics presumed to influence the course of the disease. The diagnostic criteria and interview methodology must, therefore, be internationally standarized for coherent and relevent results. A standard questionnaire may well serve the purpose. Results of some epidemiological investigations in specific countries are tabulated, including data on cough, phelgm, asthma, and smoking habits. For more detailed analyses, however, closer contact among investigators must be established.

20788 **APTIC NO. 39406**

Lob, M. and P. Desbaumes

STUDY OF PLUMBISM AND OF PLUMBURIA IN TWO GROUPS OF CONFINED INDIVIDUALS, ONE IN THE COUNTRY, THE OTHER IN THE IMMEDIATE VICINITY OF A HIGHWAY TRAVELED BY AUTOMOBILES. *(Etude de la plombemie et de la plomburie chez deux groupes de detenus, les uns internes a la campagne, les autres a proximite immediate d une autoroute). Text in French. Bull. Eidgenoess. Gesundheitsamtes, Beilage B, no. 3:84-85, March 1971. 10 refs.*

The lead content in the blood and urine of adult individuals confined to institutions of open country and in the immediate vicinity of a highway was compared. The rural group consisted of 43 individuals aged 19-79, half of them alcoholics, the other half delinquents. The group near a highway consisted of 35 individuals, aged 35-76, mostly alcoholics. The duration of internment was 16 months for the first group, 15 months for the second. The rural group was on a diet including vegetables grown in the institutional garden containing between 4 and 20 ppm lead. While no significant differences were found in the blood lead content of the two groups, the urine of the rural group contained 35.5 micrograms Pb/1, the highway group had 28.8 micrograms/l. The difference between the two findings is highly significant.

20789 **APTIC NO. 39504**

Mambrini, Jean and Pierre R. Benoit

ACTION OF NICKEL ON THE LIBERATION OF THE TRANSMITTER AT THE NEURO-MUSCULAR JUNCTION. *(Action du nickel sur la liberation du transmetteur a la jonction neuro-musculaire). Compt. Rend. Soc. Biol. (Paris), vol. 161:524-528, 1967. 12 refs. Translated from French. 7p.*

Nickel chloride dissolved in Ringer s solution was applied to the neuromuscular junction of the frog. At the concentrations used (0.5mM/liter), nickel considerably reduced the amplitude of the motor plate potential observed, under conditions of either postsynaptic (D-tubocurarine) or presynaptic (decrease in calcium concentration and increase in magnesium concentration) blockage. In the latter case, reduction in the average voltage of the motor plate potential is accompanied by a large increase in the number of losses of transmission. Since the amplitude of the miniature motor plate potential is not affected in any great degree by nickel, the decrease in the amplitude of the motor plate potential produced by the nervous impulse must be interpreted as a reduction of the quantity of acetylcholine liberated per presynaptic element. There is no relation between the lengthening of the presynaptic depolarization and the quantity of mediator liberated by the impulse. In the experiments made in the presence of D-tubocurarine, there was a lasting increase in the amplitude of the motor plate potential during washing.

20790 **APTIC NO. 39494**

Martin, A. Edmund

POLLUTION. ITS EFFECT ON HEALTH. *Ind. Process Heat., 1970:17-18, Nov. 1970.*

The impact of environmental pollution on human health is reviewed. The predominant hazard to health is tobacco smoke. Second to this come pollution of the atmosphere by smoke, soot, grit, ash, hydrocarbons, carbon oxides, sulfur oxides, nitrogen oxides, fluorides, ammonium salts, and other trace elements and the potential hazard of contamination of drinking water and foods. Studies and health statistics have established a relationship between air pollution, smoking, and various respiratory diseases, including lung cancer and chronic bronchitis. The need for research in these fields and for pollution control techniques is apparent.

20791 **APTIC NO. 39704**

McCabe, Louis C. and George D. Clayton

AIR POLLUTION BY HYDROGEN SULFIDE IN POZA RICA, MEXICO. AN EVALUATION OF THE INCIDENT OF NOV. 24, 1950. *A.M.A. Arch. Ind. Hyg. Occupat. Med., 6(3):199-213, Sept. 1952. 10 refs.*

The circumstances surrounding the air pollution incident that killed 22 persons and hospitalized 320 at Poza Rica, Mexico in the area adjacent to a recycling and sulfur recovery plant were investigated on the basis of data recorded at the time of the incident. Details are given of the sulfur plant, including the Girbitol units which employ monoethanolamine for absorption of hydrogen sulfide; the epidemiology, including topography and meteorology; the clinical findings; and pathology. All the findings are consistent with H2S poisoning as the cause of mortality and morbidity, and indicate that the source of the H2S was the effluent stack of the Girbitol unit, where difficulties with erratic and uncontrolled gas flows were being encountered. The available meteorologic data indicate that a pronounced low-altitude temperature inversion, a high concentration of haze and nuclei, and a very slight wind movement prevailed during the episode. Recommendations are made to avoid similar occurrences in the future.

20792 APTIC NO. 39257

Merrifield, P. R. and Floyd L. Ruch

THE COUNTY-WIDE SURVEY OF 1954. *In: Studies of Eye Irritation due to Los Angeles Smog 1954-1956. Air Pollution Foundation, San Marino, Calif., p. 1-67, July 1, 1957.*

As part of the 1954 aerometric survey, a measure of eye irritation was desired that should be of such a nature that its use in computing product-moment coefficients of correlation with atmospheric variables would be justified. Measures of eye irritation for groups rather than for individuals have the desirable characteristics of an individual measure and, in general, less variability due to factors other than variation in the stimulus. Selection of the panels and the eye irritation of smog sensitivity scale are discussed. Reliability, linearity, and validity of the measures are considered. For the proposed correlational analysis it was essential to know which values of the atmospheric variables should be correlated with the report values of eye irritation.

20793 APTIC NO. 39221

Milby, Thomas H.

HYDROGEN SULFIDE INTOXICATION. REVIEW OF THE LITERATURE AND REPORT OF UNUSUAL ACCIDENT RESULTING IN TWO CASES OF NON-FATAL POISONING. *J. Occup. Med., 4(8):431-437, Aug. 1962. 25 refs.*

Hydrogen sulfide is a by-product of many industrial processes. In low concentrations it is an irritant to the eyes and to the membranes of the respiratory tract. Because of this latter effect, it may cause pulmonary edema. In higher concentrations H2S exerts a direct effect on the respiratory center, causing either stimulation with resulting hyperventilation, hypocapnia, and apnea; or marked depression and paralysis. Respiratory failure and asphyxia result in either case. Hydrogen sulfide poisoning can be prevented by educating personnel regarding the hazard, controlling the environment, appropriate use of personal protective equipment, and adequate medical evaluation of potentially exposed workers. Because there is no specific therapy for H2S intoxication, treatment is aimed at relieving the signs and symptoms that develop. Artificial respiration must begin immediately for victims of H2S who are in respiratory failure. Two cases of nonfatal systemic H2S poisoning are discussed, both resulting from an attempt to dispose of an inoperative cylinder of H2S gas by perforating its side with a rifle bullet. (Author summary modified)

20794 APTIC NO. 39678

Mills, C. A.

MOTOR EXHAUST GASES AND LUNG CANCER IN CINCINNATI. *Am. J. Med. Sci., vol. 239:316-319, 1960. 4 refs.*

A 1955 survey in Cincinnati, Ohio indicated a high degree of mathematical significance in the association between lung cancer and tobacco smoking, general urban air pollution, and exposure to motor exhaust gases in urban traffic. Additional analysis of the same data shows that exposure in urban motor traffic is a significant factor in lung cancer incidence and that driving mileages above 12,000 mi per year are associated with a lung cancer hazard twice that of driving mileages below this level. This association is apparently related to the inhalation of motor exhaust products, either directly or after their atmospheric conversion to ozone or oxidant materials along the traffic stream. Lung cancer death hazards are greatest at all ages above 40 for drivers who are residents of Cincinnati's polluted Basin areas, slightly less for drivers residing in clean suburban areas, and utterly lacking for drivers residing far out in clean rural areas whose driving is mostly on open country roads. The medical profession should give specific recognition to these urban driving hazards and to motor exhaust gases as the dominant factor in the increasing development of ozone-type smogs now recognized as community health hazards at ozone concentrations above 0.1 ppm.

20795 APTIC NO. 39211

Morelli, A., R. Belli, and V. Giuliani

A SIMPLE ANALYTICAL METHOD FOR THE EXTRACTION OF CARBON MONOXIDE FROM BLOOD. *(Un semplice metodo per i estrazione ed il dosaggio dell ossido di carbonio nel sangue). Text in Italian. Folia Med. (Naples), 37(5):336-344, May 1954. 16 refs.*

A photometric method developed for the determination of carbon monoxide in ambient air was modified for the analysis of CO in the blood. Blood is treated with acid potassium ferricyanide, thus liberating CO which reduces palladium chloride to metallic palladium. Following precipitation of the latter, the excess of palladium chloride remaining in solution is determined colorimetrically following the addition of potassium iodide which added in excess yields an intense coloring. In this method the reduction of one mg palladium chloride is equivalent to 0.1577 mg or 0.1261 cu cm CO. The addition of 5 ccm PdC12 (7.91 mg% solution) to five cu cm blood suffices for up to 2.5% CO in the blood. Possible traces of hydrogen sulfide in blood are removed by washing with a lead acetate solution prior to the analysis.

20796 APTIC NO. 39384

Morgan, Jean M., Helen B. Burch, and Joyce B. Watkins

TISSUE CADMIUM AND ZINC CONTENT IN EMPHYSEMA AND BRONCHOGENIC CARCINOMA. *J. Chronic Diseases, vol. 24:107-110, 1971. 13 refs.*

The tissue cadmium and zinc content in the liver and kidneys of emphysema and bronchogenic carcinoma victims was examined, and an attempt was made to correlate the findings with smoking history or industrial exposure to cadmium dusts. Based on hospital and autopsy records, the categories included a control group (group I); group II consisting of persons with definite postmortem evidence of emphysema with bronchitis in almost all cases; group III containing patients with both carcinoma of the lung and emphysema; and group IV consisting of patients with lung cancer but without emphysema. Both zinc and cadmium were determined in all tissues; tissue cadmium was generally higher in the three study groups compared to the control. This was significant for both liver and kidney for groups III and IV. Liver tissue in emphysema contained significantly more cadmium. Zinc concentrations were significantly increased in group IV. Smoking was common to all groups. Occupational exposure to dusts, most commonly mining, was recognized in 23% of the emphysema patients and in 4% and 5%, respectively, of the cancer and emphysema groups, but data were incomplete.

20797 APTIC NO. 39725

Nadel, Jay A.

PULMONARY RESPONSES TO AEROSOLS. *California State Dept. of Public Health, Air Pollution Med. Res. Conf., 3rd. Los Angeles, Calif., 1959, p. 66-74. (Dec. 9-10.)*

The mechanisms of lung reactions to the inhalation of aerosols were studied using the body plethysmograph. The effect of cigarette smoke on airway conductance in normal subjects and in patients with cardiopulmonary diseases, and the mechanism of decreased airway conductance after smoking, were investigated. Ongoing studies of the effect of irritant gases and aerosols on airway conductance, the mechanism of decreased airway conductance in diseases, and the relationship between the airway conductance of individual lungs and between upper and lower airways are noted.

20798 APTIC NO. 38977

Neal, Jack and Norman M. Trieff

ISOLATION OF AN UNKNOWN CARCINOGENIC POLYCYCLIC HYDROCARBON FROM CARBON BLACKS. *Health Lab. Sci., 9(1):32-38, Jan. 1972. 14 refs. (Presented at the American Public Health Association, Annual Meeting, 98th, Minneapolis, Minn., Oct. 14, 1971.)*

An unknown polynuclear hydrocarbon, compound X, was isolated from eight out of nine commercial carbon blacks studied and found to exist in significant concentrations in the benzene extracts, particularly in the aromatic oil furnace black. Techniques of isolation involved column chromatography on silica gel and alumina and crystallization. Physicochemical parameters suggest that the compound is either very similar to or identical to acepyrene isolated previously by Wallcave from coal tar pitch. Isolation of a similar or identical substance was effected in the same way from industrial air particulate. Compound X was shown to induce fibrosarcomas in CFW mice, and is believed to exert a co-carcinogenic action with benzo(a)pyrene. (Author abstract)

20799 APTIC NO. 39197

Nelson, William C., Victor Hasselblad, and Gene R. Lowrimore

STATISTICAL ASPECTS OF A COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM. *Preprint, California Univ., Berkeley, 18p., Sept. 10, 1970. 5 refs. (Presented at the Berkeley Symposium on Mathematical Statistics and Probability, 6th, Berkeley, Calif., July 19, 1971.)*

The Community Health and Environmental Surveillance System (CHESS) is a continuing series of epidemiological studies carried out in selected communities representing an exposure gradient for the most common air pollutants. The program involves monitoring of various pollutants and simultaneous surveillance of health indicators known to be sensitive to variations in environmental quality. Indicators currently used include symptoms of chronic respiratory disease in adults, incidence of acute respiratory disease in families, pulmonary function testing of school children, daily symptom reporting of asthmatics and elderly patients with chronic heart or lung disease, and tissue concentrationns of selected trace elements. Statistical problems associated with the health effects studies are cumulative frequency distribution transformations; mixed model categorical data problems; fitting the hockey stick function; truncated or missing data; estimating individual pollutant exposure; and the problem of intercorrelated multivariate time series. Solutions to these problems are needed to demonstrate dose-effect relationships and to establish standards.

20800 APTIC NO. 38733

Nieding, G. von and H. Krekeler

LUNG FUNCTION IN HEALTHY SUBJECTS AND IN PATIENTS WITH CHRONIC BRONCHITIS AS AFFECTED BY ACUTE EXPOSURE TO NO2. *(Pharmakologische Beeinflussung der akuten NO2-Wirkung auf die Lungenfunktion von Gesunden und Kranken mit einer chronischen Bronchitis). Text in German. Int. Arch. Arbeitsmed., vol. 29:55-63, 1971. 23 refs.*

The protective action of atropine, meclastine, and orciprenaline in 14 healthy subjects and 23 patients suffering from chronic bronchitis exposed to a nitrogen dioxide-air mixture (5-8 ppm NO2) was examined. Meclastine, as compared with atropine and orciprenaline, exhibited a pronounced protective effect with regard to the negative impact of NO2 on respiratory gas exchange and airway resistance. Nitrogen dioxide, therefore, acts by a release of histamine to effect a bronchiolar, alveolar, and interstitial edema.

20801 APTIC NO. 39454

Noel, James K.

COMPLEMENT FIXATION, HEMAGGLUTINATION-INHIBITION AND TRYPSIN INHIBITORY CAPACITY TESTING OF HUMAN SERA. (FINAL REPORT). *Flow Labs., Inc., Rockville. Md., Air Pollution Control Office Contract 68-02-0032, 107p., Feb. 2, 1972.*

NTIS: PB 206822

Hemagglutination-inhibition (HAI) and complement fixation (CF) tests were performed on over 3000 human serum samples, 2000 of which were also tested for trypsin inhibitory capacity. In the HAI procedure, each sample was tested with four flu antigens: Flu A-2/Japan, Flu A-2/Hong Kong 68, Flu B/Maryland, and Flu B/Massachusetts. The CF tests utilized Influenza Group A and B soluble antigens. All tests results are tabulated. The HAI figures represent the reciprocal of the highest serum dilution with completely inhibited agglutination and the CF figures the reciprocal of the highest dilution of serum giving at least a 3+ fixation on an 0-4 scale with 4+ being no hemolysis of the indicatory system.

20802 APTIC NO. 39426

Oswald, Ian

SLEEP, DREAMING AND DRUGS. *Proc. Roy, Soc. Med., vol. 62:151-153, Feb. 1969. 29 refs.*

Paradoxical sleep differs from orthodox sleep in the appearance of the electroencephalogram, and in that, although the eyeballs jerk around and more sudden body movements are made, the skeletal muscles are otherwise much more relaxed. If selectively deprived of one or the other kind of sleep, we compensate specifically for it as soon as we get the chance. The most important sleep disorder remains insomnia, but other abnormal sleep patterns are mentioned. The transition between orthodox and paradoxical sleep is abrupt, allowing measurement of the delay between sleep onset and the first such transition, and of the relative proportions of the two kinds of sleep. Sleeping pills, such as barbiturates, suppress paradoxical sleep, and all the common drugs of dependence have it in common that they suppress paradoxical sleep and induce a long rebound on withdrawal. To cause both seems a hallmark of addictiveness. Alcohol withdrawal is accompanied by up to 100% of paradoxical sleep at the time the patient is entering his delirium tremors.

20803 APTIC NO. 39621

Pecora, L., A. Silvestroni, and A. Brancaccio

RELATIONS BETWEEN THE PORPHYRIN METABOLISM AND THE NICOTINIC ACID METABOLISM IN SATURNINE POISONING. *Panminerva Med., vol. 8:284-288, 1966. 6 refs.*

Relations between porphyrin and nicotinic acid metabolism in lead poisoning were studied in experiments with three groups of six rabbits each. The first group was poisoned with 20 cg of lead acetate/day; the second group, poisoned as the first one, was treated from the first day onwards with 30 mg of nicotinic acid; the third group was dosed with nicotinic acid after the

15th day of poisoning. Urinary lead, erythrocyte free protoporphyrin, urinary coproporphyrin, aminolevulinic acid, and porphobilinogen in the urine, as well as nicotinic acid in the blood and urine, and xantheremic acid in the urine, were observed in all the animals. The inhibitory effect of lead on nicotinic acid formation was confirmed. Lead blocks the pathways from tryptophan to nicotinic acid and causes a considerable decrease in the nicotinic acid content in the blood as well as in the urinary elimination. Consequently the synthesis of pyridine coenzymes is inhibited. At the same time, the urinary elimination of xanthurenic acid increases considerably. This phenomenon is presumably due to a blockade of vitamin B6, which acts on the pathway from 3-oxykymurenine to 3-oxyanthranilic acid from where it arrives to the nicotinic acid through the quinolinic acid. The nicotinic acid is able not only to limit the urinary coproporphyrin elimination but also to inhibit the increase of erythrocyte free protoporphyrin, amino levulinic acid, and porphobilinogen. The fact that the nicotinic acid tends to normalize the disturbance of the porphyrinic metabolism, leads to the assumption that in saturnism it is, at least partially, a consequence of the action the lead has on the nicotinic acid, directly or indirectly through vitamin B6 inhibition, yielding a decrease of the pyridinic coenzyme synthesis. (Author conclusions modified)

20804 APTIC NO. 39503

Pentschew, A. and H. Kassowitz

COMPARATIVE INVESTIGATIONS ON THE EFFECTS OF VARIOUS METALLIC SALTS ON THE CENTRAL NERVOUS SYSTEM OF RABBITS. *(Vergleichende Untersuchungen ueber die Wirkung verschiedener Metallsalze auf das Zentralnervensystem von Kaninchen). Arch. Exp. Pathol Pharmakol., vol. 163:667-684, 1932. 16 refs. Translated from German. 31p.*

A total of 29 water-soluble metallic salts were given by suboccipital injection to rabbits in order to compare the toxicity of these metals with the effect of lead on the central nervous system. Effects of the injections and the minimum lethal doses are indicated.

20805 APTIC NO. 39741

Pinkerton, Cecil, John P. Creason, Carl M. Shy, Douglas I. Hammer, Robert W. Buechley, and Gopala K. Murthy

CADMIUM CONTENT OF MILK AND CARDIOVASCULAR DISEASE MORTALITY. *Preprint, Missouri Univ., Columbia, 15p., 1971. 22 refs. (Presented at the Conference on Trace Substances in Environmental Health, Annual, 5th, Columbia, Mo., June 29-July 1, 1971.)*

The cadmium content of milk, population density, and water hardness were studied in relation to white male cardiovascular disease mortality rates (CVD) in 59 U. S. cities. Concentrations of cadmium in pasteurized milk supplies of these cities were correlated with the 1959-1961 white male CVD of the corresponding counties. City and county population density and spring 1965 and 1967 milk cadmium content showed positive simple correlations with CVD; water hardness showed weak negative correlation. All environmental variables were not independent; therefore variance relating population density, water hardness, and milk cadmium simultaneously to CVD was analyzed, determining significant effects only for city and county population density and indicating that the simple correlations with milk cadmium and water hardness were secondary associations. Limitations of correlation analysis and more sensitive methods of studying trace metals in relation to CVD are discussed. (Author abstract modified)

20806 APTIC NO. 38975

Prochazka, Rudolf

DUST MEASUREMENTS IN OPERATING RANGE OF ELECTRIC FURNACES FOR IRON ALLOYS. 1. MEASUREMENT IN FERROSILICON ELECTRIC FURNACES. *(Staubmessungen im Arbeitsbereich von Elektrooefen fuer Ferrolegierungen. 1. Teil: Messungen an Ferrosilizium- Elektrooefen). Text in German. Staub, Reinhaltung Luft, 31(9):361-366, Sept. 1971. 27 refs.*

A critical review of the literature is presented. Introductory investigations of ferrosilicon furnaces have revealed that sus pended dust and smoke occurring within the operating range of the furnaces contain mainly X-ray amorphous silica (SiO2), the concentration of which varies considerably with time. The amorphous SiO2 not only has a damaging effect on cells in biological tests, but also causes silicotic tissue reactions in animal tests. It is apparent, therefore, that X-ray amorphous SiO2 condensates from electrochemical blast furnace processes have silicogenic effects.

20807 APTIC NO. 39574

Ramirez-R., J. and A. R. Dowell

SILO-FILLER S DISEASE: NITROGEN DIOXIDE-INDUCED LUNG INJURY. *Ann. Internal Med., 74(4):569-576, April 1971. 42 refs.*

The spectrum of silo-filler s disease based on detailed analysis of reported cases is reviewed, and the case history of the clinical and physiological symptoms of a patient examined for 7 years after a single toxic exposure to silage gas is examined. Chest films of the patient showed diffuse reticular and fine nodular infiltrates. Except for mild hypoventilation and hypoxemia, pulmonary function remained normal. The clinical features of silage exposure include chest tightness, cough, dyspnea, wheezing, nausea, and vomiting; after the acute response, symptoms of pulmonary edema or bronchiolitis are usually observed. The mechanisms of tissue injury are examined. Within the silage emissions, nitrogen dioxide and its dimer are responsible for pulmonary injury; the threshold limit of NO2 for human industrial exposure is set at 5 ppm. Treatment and aids after diagnosis are discussed.

20808 APTIC NO. 39523

Rockstroh, H.

ON THE ETIOLOGY OF BRONCHIAL CANCER IN ARSENIC PROCESSING NICKEL SMELTING PLANTS. *Arch. Geschwulstforsch., vol. 14:151-162, 1959. 45 refs. Translated from German. 22p.*

During an 11-year period, 45 cases of bronchial carcinoma were observed in an average labor force of 111 in a nickel-smelting plant. Two workers contracted a skin carcinoma, and a defect of the nasal septum was diagnosed in 39 cases. Nearly all workers had hyperkeratoses of the hands and feet, whereas arsenic melanoses could be detected in only three cases. Rock dust as a mechanical irritant factor, sulfuric acid, and hydrochloric acid vapors as well as chlorine gas, together with carbon monoxide plus carbon dioxide, produce the prerequisite for cancer formation in the form of a chronic irritative bronchitis. Under the influence of arsenic, which is present in nearly all phases of nickel extraction, bronchial cancer develops. Case histories are presented. (Author summary modified)

20809 APTIC NO. 39219

Roholm, Kaj

THE FOG DISASTER IN THE MEUSE VALLEY, 1930: A FLUORINE INTOXICATION. *J. Ind. Hyg. Toxicol., 19(3):126-137, March 1937. 47 refs. (Presented at the Danish Society for Internal Medicine, Oct. 30, 1936.)*

The fog disaster which occurred in the Meuse Valley near Liege, Belgium, early in December 1930, involved several thousand cases of sickness and 60 deaths. An analysis of the details of the disaster gives circumstantial evidence that the malady was acute fluorine intoxication. Of the 27 factories in the region, fifteen are industrial branches which either use raw products containing fluorine (superphosphate works, zinc works) or add fluorine compounds to the raw materials (steel works, iron foundries, glass works), involving the possibility of passing gaseous fluorine compounds into the chimney smoke. Special climatic and topographic conditions played an important role in the development of the disaster. A survey of acute and chronic fluorine intoxication is included. (Author summary modified)

20810 APTIC NO. 38867

Saito, Kazuo, Hiroko Inai, and Eimatsu Takakuwa

STUDIES ON GASOLINE INTOXICATION. PART 1. ELECTROENCEPHALOGRAPHICAL CHANGES AND LEAD CONTENT IN ORGANS OF RATS ADMINISTERED LEAD-FREE AND LEAD CONTAINING BRANDS OF GASOLINE. *(Gasorin no dokusei ni kansuru kenkyu. Daiippo. Shihan muen oyobi kaen gasorin toyo ratto no nohagakuteki henka narabi ni zokichu enryo). Text in Japanese. Sangyo Igaku (Jap. J. Ind. Health), 14(1):9-20, Jan. 1972. 48 refs.*

The effects of lead in gasolines in the central nervous systems in relation to the amount of lead in the organs were investigated in rats implanted with electrodes to record electroencephalographic changes. Three groups of rats were injected with 1 ml/100 g body weight of nonleaded gasoline, leaded regular gasoline, and leaded high-octane gasoline. Tetraethyl lead contents were 0.0, 0.15, and 1.41 ml/l, respectively, corresponding to the amount of tetraethyl lead in rats/kg body weight, i.e., 0.0, 2.5, and 23.3 mg. Lead content of the brain, heart, lung, liver, kidney, and blood was also determined. The increase in death rate was directly proportional to the amount of tetraethyl lead in the gasolines. Before gasoline injection, the EEG from the surface of the cortex was dominant in the theta wave and had a greater amplitude than that of other electrodes. In acute poisoning at the first to third day after injection of the leaded high-octane gasoline, the beta wave was dominant. The rats also exhibited symptoms of ataxia, drowsiness, dullness, nystagmus, convulsions of extremities, and lowering of body temperature. On the second day after injection, theta wave was less marked and beta wave was more dominant in the order of nonleaded gasoline, regular lead gasoline, and leaded high-octane gasoline. The amount of lead in the organs 10 days after injection did not differ with respect to distribution in the nonleaded gasoline group; values ranged within 0.35-0.54 gamma/g. In the groups injected with leaded gasolines, the content of lead was greatest in the liver, with values of 7.32 + or 0.42 gamma/g in the leaded regular gasoline group and 7.44 + or 1.86 gamma/g in the leaded high-octane gasoline group; respective lead content in the brain was 1.18 + or 0.09 and 1.26 + or - 0.34 gamma/g. In general, the changes in EEG and average auditory evoked response were parallel with the level of poisoning.

20811 APTIC NO. 39193

Sayers, R. R., A. C. Fieldner, W. P. Yant, B. G. H. Thomas, and W. J. McConnell

EXHAUST GASES FROM ENGINES USING ETHYL GASOLINE. *Bureau of Mines, Washington, D. C. and Bureau of Mines, Pittsburgh, Pa., Pittsburgh Experiment Station, Rept. 2661, 24p., Dec. 1924. 13 refs.*

Various types of animals (rabbits, guinea pigs, pigeons, dogs, and monkeys) were exposed for 3-6 hr/day for up to 8 mo to definite concentrations of exhaust gas from an engine using ethyl gasoline. Blood and weight data are given for the exposed animals along with autopsy findings. No objective symptoms of plumbism were noted, and lead tissue accumulations, as determined in 25 autopsies, were insignificant. For all but two animals the value was on the order of 0.003 mg. With the exception of animals dying from causes ascertained to be other than due to lead, all remained normal as to activity, growth, appetite, and general health. Those that died had normal appetites and were active to within a couple of days before death, which is not in accordance with lead poisoning. The non-occurrence of lead poisoning was further substantiated by the small quantity of lead present in the exhaust gas-air mixture, together with observations on men that 75% of lead from exhaust is exhaled when inhaled.

20812 APTIC NO. 39518

Schleittwein-Gsell, Daniela and Sibylle Mommsen-Straub

TRACE ELEMENTS IN FOODS. V. NICKEL. *(Spurenelemente in Lebensmitteln. V. Nickel). Int. Z. Vitaminforsch., vol. 41:429-437, 1971. 19 refs. Translated from German. 14p.*

Evidence for a physiological role of nickel is accumulating, and measurements of serum nickel may prove useful in diagnosis of acute myocardial infarction. Average daily exposure to nickel can show great variation depending on diet. All cereals, vegetables, and fruits naturally show a more or less high content of nickel, while very small values have been found in the muscle of fishes and mammals and in eggs and milk. Certain foods may also require nickel during processing. The nickel content of various foods is presented, as well as a survey of the authors who have performed nickel analyses and information on the methodology and the source of the foods studied. (Author summary modified)

20813 APTIC NO. 39376

Schmidt, Ferdinand

CONTRIBUTION TO THE PROBLEM OF PASSIVE SMOKING. *(Zum Problem des Passiv-Rauchens). Text in German. Muench. Med. Wochschr. (Munich), 113(18):702-705, April 1971. 7 refs.*

Facts confirming the harmfulness of smoke for passive smokers are presented. The tumor incidence in mice, chronically exposed to cigarette smoke, reached 46% in certain series, and lung tumors were revealed in golden hamsters passively inhaling smoke. The proportion of the cigarette smoke which is not inhaled contained considerably higher amounts of carcinogenic and other harmful substances (pyridine, phenols, and ammonia) than the main current inhaled by the smoker. The tar from the escaping smoke contained about three times more 3,4-benzopyrene than that from the main current. Though retarded nicotine resorption during passive inhalation, and rapid sedimentation of the nicotine may be possible, the difference in the exposure of smokers and non-smokers is not significant. Cigarette smoke is particularly harmful for persons suffering from chronic sinusitis, chronic bronchitis, emphysema, asthma, and other allergies. Since smoking represents a potential but avoidable danger to non-smokers, it should be prohibited in working places.

20814 APTIC NO. 39447

Schrenk, H. H., Harry Heimann, George D. Clayton, W. M. Gafafer, and Harry Wexler

AIR POLLUTION IN DONORA, PA. EPIDEMIOLOGY OF THE UNUSUAL SMOG EPISODE OF OCTOBER 1948. (PRELIMINARY REPORT). *Public Health Bull. No. 306, 173p., 1949. 92 refs.*

A heavy smog in the area around Donora, Pa. in October 1948 which caused 20 deaths and countless illnesses triggered a study of the epidemiology of the smog-pollution episode with regard to the immediate and long-term biological effects on the community, atmospheric studies, and causes. The geographic, meteorologic, and industrial status of the area is described. A total of 42.7% of all persons in the Donora area were affected to some degree by the smog; the affect was essentially an irritation of the respiratory tract, with cough as the predominant single symptom. Both incidence and severity varied directly with increasing age. Other significant factors included cardiorespiratory diseases, certain characteristics of housing quality, and chronic cardiovascular diseases. Atmospheric studies included data on emissions from local zinc and steel plants; sources included the sintering plant, boilers, sulfuric acid plant, blast furnaces, and open hearth furnaces. The pollutants, including sulfur, nitrogen oxides, chloride, fluoride, arsenic, antimony, lead, cadmium, zinc, iron, manganese, sulfur dioxide, carbon monoxide, carbon dioxide, and acid gases, emitted either as stack gases or particulates were measured directly from the source and the results were correlated with wind mechanisms, thermal structure, temperature, stability, pressure, atmospheric movements, and topographic interactions. Pollution from domestic sources, steamboats, trains, and automobiles were also considered. On the basis of the measurements, the cause of the episode could be traced to a synergism of influences, i.e., plant emissions, atmospheric pollution, and micrometeorologic conditions. Complete data on air quality measurements, health statistics, and atmospheric studies are presented.

20815 APTIC NO. 39161

Schuetze, Christian

TWENTY-FOUR POINTS FOR ENVIRONMENT CONSCIOUS BEHAVIOR. *(24 Punkte fuer umweltbewusstes Verhalten. Text in German. Umwelt (Duesseldorf), 2(2):36-37, April 1972.*

Some methods to control environmental damages are outlined. With respect to the effects of pollution on human health, harmful effects are caused by any kind of sprays, since the sprayed particles are so small that they penetrate through the filter of the human respiratory system. Plastic waste should not be burned because toxic gases form during combustion. When filling the tanks of cars, care must to taken to avoid benzene spills since tetraethyl lead vapors are dangerous and may cause skin damages. The carburetor of the car should be adjusted that the benzene percentage in the benzene-air mixture is smaller than the percentage of air in order to reduce the concentration of unburned hydrocarbons in the exhaust gas.

20816 APTIC NO. 39086

Sellick, Hilary and J. G. Widdicombe

STIMULATION OF LUNG IRRITANT RECEPTORS BY CIGARETTE SMOKE, CARBON DUST, AND HISTAMINE AEROSOL. *J. App. Physiol., 31(1):15-19, July 1971. 25 refs.*

Action potentials were recorded from single vagal verve fibers from lung irritant receptors in bilaterally vagotmoized rabbits. The receptors were stimulated when the rabbits inhaled cigarette smoke, inert carbon dust, and a 5% solution of histamine acid phosphate. Since these three aerosols cause vagal reflex hyperpnea and vagal reflex bronchoconstriction in man and other experimental animals, and since previously published work indicates that these are the reflex responses of stimulation of lung irritant receptors, it is concluded that the irritant aerosols produce their reflex responses by stimulation of lung irritant receptors. They may cause or contribute to the breathlessness sometimes associated with their conditions. (Author abstract modified)

20817 APTIC NO. 38880

Shishido, Masao

ON RESULTS ON FACT-FINDING SURVEY ON EFFECTS OF PHOTOCHEMICAL POLLUTION ON HUMAN BODY. *(Kokagaku kogai ni yoru jintai eikyo no jittai chosa kekka ni tsuite). Text in Japanese. Kanagawa Prefectural Photochemical Working Group (Japan), 3p., 1971.*

This is an intermediate report on the findings obtained from an epidemiological study of the effects on humans caused by photochemical pollution reported chiefly in Kawasaki on Sept. 20, 1971. Questionnaires were handed to 7301 pupils of 14 primary schools, seven middle schools and two high schools where 50 or more pupils were reported to have suffered from the pollution. The questionnaires were recovered from 7294 persons. Of them, those affected by the pollution were 3649 males (94.8%) and 3292 females (95.5%). Symptoms of the suffering appeared most or 40.5% of total at 1 pm followed by 23.3% at 2 pm. The physical complaints from the sufferers were those affecting the eyes, respiratory organs, and heart. The complaints involving eyes were reported by 85.2% of the people, those of the respiratory organs by 67.5%, and those of the heart by 10.1%. The symptom occurrence factor and the oxidant concentration highly correlated. There were cases where nitrogen dioxide had something to do with it. Oxidants, nitrogen oxides, sulfur oxides, and suspended dust are all at higher level at the time when the symptoms of photochemical pollution occur; the atmosphere is polluted with increased pollutants so that it is foggy and gives poor visibility.

20818 APTIC NO. 39525

Shukhtina, A. M. and A. N. Butts

INCIDENCE OF NEPHRITIS (BASED ON POLYCLINIC OBSERVATIONS). *(O zabolevayemosti nefritom (po dannym poliklinicheskikh nablyudeniy). Sov. Med., vol. 27:125-130, Sept. 1963. Translated from Russian. 11p.*

Data from the records of a Leningrad hospital indicate that the incidence of acute nephritis per 1000 persons in the adult population in 1959 was 0.62 (0.67 for men and 0.58 for women). The greatest incidence of disease was observed among individuals 18-19 years of age (1.16 per 1000). Acute nephritis was preceded by angina in 46% of the patients, and by flu and upper respiratory inflammation in 36%. In 34.2% the disease was observed to take a chronic course. No conclusions were possible concerning the frequency of affliction with nephritis in relation to occupation. However, body supercooling and prolonged and systematic confinement in moist rooms during their work was noted for 52 of the 152 victims of acute nephritis. Treatment of nephritis is noted.

20819 APTIC NO. 39500

Siess, M. and H. -E. Glo.nme

RATE OF C(14)-GLUCOSE AND C(14)-HEXANOATE DECARBOXYLATION IN ISOLATED GUINEA-PIG AURICLES AS A FUNCTION OF EXTRACELLULAR SUBSTRATE CONCENTRATION, THEIR COMPETITION, AND THE DIRECT ACTION OF DRUGS. *(Die Decarboxylierungsgeschwindigkeit von C(14)-Glucose und C(14)-Hexanoat im isolierten Meerschweinchenherzvorhof in Abhangigkeit von der extrazellularen Substratkonzentration, ihrer Konkurrenz sowie der direkten Einwirkung von Pharmaka). Arzneimittel-Forsch., 18(11):1357-1368, 1968. 39 refs. Translated from German. 35p.*

Regulation of energy production in isolated atria of guinea pigs was investigated by continuously measuring the decarboxylation rate of carbon-14-labelled glucose and of C(14)-labelled hexanoate together with the mechanical work of contraction. If oxygen supply was in excess, the decarboxylation rate rose with external concentrations according to Michaelis-Menten kinetics. The same concentrations of hexanoate which increased the decarboxylation rate of hexanoate inhibited the decarboxylation rate of glucose competitively by 50%. Glucose had no effect upon the decarboxylation rate of hexanoate in arrested atria, while the decarboxylation rate in beating atria rose with the spontaneously increasing frequency caused by the addition of glucose. Hydroxybutyrate inhibited the decarboxylation rate of glucose, and strophanthin increased the decarboxylation rate of glucose. Epinephrine had no effect upon the decarboxylation rate of either substrate in arrested atria. Triiodothyronine or thyroxine enhanced the decarboxylation rate of glucose in beating atria and reinforced the effect of strophanthin upon the decarboxylation rate of glucose. Implications of these results are discussed. (Author abstract modified)

20820 APTIC NO. 39501

Siess, M., K. Mueller, and U. Peter

CONTINUOUS MEASUREMENT OF THE DECARBOXYLATION RATE OF C(14)-LABELLED SUBSTRATES IN FAT AND CARBOHYDRATE METABOLISM IN

ISOLATED GUINEA PIG AURICLES AND SIMULTANEOUS DETERMINATION OF CONTRACTION POWER AS A METHOD FOR TESTING CARDIAC DRUGS. *(Die kontinuierliche Messung der Decarboxylierungsgeschwindigkeit 14(C)-markierter Substrate des Fett- und Kohlenhydratstoffwechsels in isolierten Meerschweinchenherzvorhoefen unter gleichzeitiger Bestimmung der Kontraktionsleistung als Methode zur Pruefung Herzwirksamer Agentien). Arzneimittel-Forsch., 18(10):1245-1255, 1968. 14 refs. Translated from German. 34p.*

A method is described which allows the continuous measurement of the rate of carbon-14-labelled carbon monoxide production by isolated heart auricles and other muscle preparations after incubation with the C(14)-labelled substrates. The efficiency of energy production as measured by substrate consumption can be compared quantitatively under defined conditions with the simultaneously measured mechanical work of contraction. The ratio between the basic metabolic rare and the functional rate of glucose and hexanoate dependence on the mechanical work of contraction and was about 1:1. Decarboxylation of glucose and hexanoate was completely inhibited by anoxia. In contrast to the metabolism of bacteria, no decarboxylation of C(14)-labelled glucose via the pentose-phosphate-shunt was found in heart muscle during anoxia. No leakage of decarboxylating enzymes from the heart auricles into the external solution was observed during anoxia or during an aerobic incubation time of 14 hr. Hydroxybutyrate has a rate of decarboxylation similar to that of hexanoate and glucose, while acetone is not decarbosylated by atria of guinea pigs. (Author abstract modified)

20821 APTIC NO. 39558

Silver, Francis

MEASUREMENT OF LIFE. *Preprint, Human Ecology Research Foundation, Bethesda, Md., 16p., 1970. 10 refs. (Presented at the Clinical Ecology, Advanced Seminar, 4th, Oakbrook, Ill., Dec. 5, 1970.)*

The factor of intensity in health costing is developed in the manner of design engineering, and square-wave theory as an approach to the quantification of health. Six dimensions of living are discussed: (1) stupor; (2) paranoid or schizophrenic phychotic; (3) neurotic; (4) rational; (5) creative; and (6) inspired. Reduction of these dimensions (i.e., shortening of life) by acute or chronic adverse exposures is considered with special reference to the latter two. Chronic rather than acute conditions halve the contribution of an individual lifetime to society. If man designs his environment as though loss of life is a linear function of years, when it may acually be a 4-6 power function, the consequences to society will be unfortunate.

20822 APTIC NO. 39712

Solotorovsky, Morris, Elliott Ironson, and Seymour Winsten

THE ANTITUBERCULOUS ACTIVITY OF ETYYL MERCAPTAN. *Am. Rev. Tuberc. Pulmonary Diseases, vol. 74:72-77, 1956. 6 refs.*

Ethyl mercaptan showed high antituberculous acitivity in mice when administered by stomach tube or as a gas. By stomach tube it was approximately half as active as dihydrostreptomycin administered by parenteral route. When administered as a gas, a concentration of 200 ppm of ethyl mercaptan was moderately active when mice were exposed to the gas for 3 hr/day and highly active when mice were exposed continuously to this concentration of gas. Ethyl mercaptan and methyl mercaptan inhibited Mycobacterium tuberculosis, human strain H37Rv, in vitro. (Author summary).

20823 APTIC NO. 39531

Sroka, Karl H.

ODOR AND HEALTH. I. PHYSIOLOGICAL ASPECTS OF THE ODOR NUISANCE. II. IMPAIRMENT OF HEALTH. III. ODOR CONTROL. *(Geruch und Gesundheit. I. Physiologisches zur Geruchsplage. II. Gesundheitliche Schaedigungen. III. Geruchsbekaempfung). Text in German. Forsch. Fortsch., 27(2):42-46, Aug. 1953.*

Long-term occupational exposure to odors results in essential anosmia as a result of pathological changes of the olfactory epithelium; respiratory anosmia leads to inflammation and inactivity and finally degeneration of the olfactory organ, sometimes even to nose bleeding. A further result can be loss of appetite, nervousness, headache, vomiting, fainting, and respiratory difficulties. Total or partial loss of the olfactory sensation, parosmia, and olfactory paresthesia can contribute to psychic impairment in the form of depression. Odor control implies adeqaute renewal of the atmosphere through ventilation. An indicator of the degree of accumulation of noxious odors in the atmosphere is the carbon dioxide content in the air which can be measured with the help of a barium hydroxide solution. While the requirement of air per man hour is 33 cu m, some metal industries require up to 100 cu m fresh air per man hour, which can only be achieved by artificial ventilation. Removal of malodorous air by suction is best when combined with a supply of fresh air. Odor control must concentrate not only on work rooms but on the sources of odors as well and installations to that end should be incorporated in plant building plans. Where the emission of odors in industry cannot be completely prevented, ozonization is used; it is produced by electrical discharges between two electrodes in a humid atmosphere. Ozonization should always be combined with fresh air supply. It must never be used where it could mask escaping toxic gases.

20824 APTIC NO. 39524

Starovoytov, I. M. and I. V. Duda

CONCENTRATION OF TRACE ELEMENTS IN THE BLOOD OF PATIENTS WITH CANCER AND PRECANCEROUS CONDITIONS OF THE UTERINE CERVIX. *(Kontsentratsiya mikroelementov v krovi bol nykh rakom i predrakovymi sostoyaniyami sheyki matki). Vopr. Onkol., vol. 16:14-18, 1970. 14 refs. Translated from Russian. 9p.*

Victims of uterine cervical cancer exhibit a reliable decrease in the concentration of manganese and an increase in blood chromium concentration. The nickel content does not significantly increase. In the cancerous tumor and in adjacent uterine tissues the content of those trace elements studied is higher than normal. Abnormal concentrations of these elements are already detectable in precancerous states of the uterine cervix. Blood analysis of patients with this form of cancer 6-12 mo after treatment revealed a normal Mn content and an unchanged level of nickel; Cr content remained high. (Author summary modified)

20825 APTIC NO. 39142

Thomas, H. V., R. L. Stanley, SuzAnne Twiss, and P. K. Mueller

SPUTUM HISTAMINE AND INHALATION TOXICITY. *Environ. Letters, 3(1):33-52, 1972. 26 refs.*

Differences in sputum histamine levels expressed as histamine in micrograms/g dry specimen weight were examined as indicators of the degree of atmospheric insult to the lungs. Four groups of people in the Los Angeles area represented varied conditions of exposure, i.e., an urban population exposed to ambient air pollution levels; individuals occupationally exposed to gases and particles near threshold limits; volunteers exposed to threshold values of styrene; and patients with obstructive pulmonary diseases and healthy persons exposed to control levels of nitrogen dioxide. Sputum histamine samples and pulmonary function were studied and correlated with the effects of place of residence, sex, age, smoking habits, exposure to oxidants, NO2, and particulates, and occupational exposure. Specimen weight in persons with obstructive pulmonary disease subjected to respiratory inhalation of NO2 increased significantly with no accompanying histamine increase, resulting in significantly lower sputum histamine concentration. With respect to the role of sex and age, both sexes showed an increase in specimen weight with age; however, males, particularly those 60 years and older, also demonstrated elevated sputum histamine concentrations. The group residing in the area with prolonged exposure to high NO2 and particulate levels had the highest histamine concentrations. Those living in areas with high oxidant levels but lower concentrations of NO2 and particulates showed no elevated histamine levels. In the controlled industrial exposure studies, specimen weight increased in employees exposed to high toluene diisocyanate levels. Exposure to styrene monomer, however, yielded no difference in histamine concentration between the control and exposure groups, although there was a tendency for increased specimen weight and a rise in histamine at the highest exposure level. Sputum histamine analysis, therefore, is somewhat limited as a screening test for respiratory irritation. (Author conclusions modified)

20826 APTIC NO. 39227

Truhaut, Rene and Monique De Clercq

POSSIBLE CANCER RISKS FROM POLLUTED CITY AIR. RESULTS OF PERSONAL RESEARCH ON THE AIR OF PARIS. *(Risques de cancerisation pouvant resulter de la pollution de l air des villes. Resultats de recherches personelles sur l air de Paris). Text in French. A.P.P.A. (France), 2(1):62-67, Jan.-March 1960. 5 refs.*

One cause of increasing lung cancer is urban air pollution. Cancerogenic substances are emitted from incomplete combustion, exhaust gases, and the wear of tires on road surfaces. Dust samples from city air have proved to be cancerogenic in animal tests and the cancerogenic effect of soot has long been known. Analyses of soots vary depending on the fuel and on combustion conditions, but all soots contain high quantities of polynuclear aromatic compounds, such as 3,4-benzpyrene. This substance could not be identified in dust samples from Paris, but basic and neutral fractions of other polynuclear aromatic compounds, including benzo-3,4-phenanthrene and dibenzo-1,2,3,4-anthracene, were detected by ultraviolet spectroscopy. Aliphatic epoxides formed as a result of incomplete combustion are also cancerogenic nature, and arsenic compounds may be implicated. The effects of carcinogens may be enhanced by the presence of other, non-cancerogenic substances.

20827 APTIC NO. 39236

Truhaut, R. and G. Le Moan

ON QUANTITATIVE CARBON MONOXIDE DETERMINATION IN ATMOSPHERE AND BIOLOGICAL ENVIRONMENTS. *(Sur la determination quantitative de l oxyde de carbone dans les atmospheres et dans les milieux biologiques). Text in French. Progr. Med. (Paris), vol. 87:427- 435, Dec. 10, 1959. 38 refs.*

Both physical and chemical methods can be used for the characterization and analysis of atmospheric carbon monoxide. Among physical methods, those based on infrared absorption, and the related instrumentation, are described. Chemical methods based on catalytic oxidation of CO in carbon dioxide, CO oxidation at high temperatures, iodine anhydride reduction, and reduction of palladium salts and complexes are reviewed. Carbon monoxide analysis in biologic environments, particularly in blood, can be made in using methods based on properties of carboxyhemoglobin, or on direct blood tests. Determination can be performed after the extraction of the gases from the blood, or by microdiffusion, taking advantage of the reducing effect of CO on palladium chloride. Applications and sensitivities are given for the various methods.

20828 APTIC NO. 38942

Tsunoda, Fumio, Hiroko Kunida, and Kazuo Sasaki

A STUDY ON THE EFFECTS OF AIR POLLUTION DUE TO FLUORIDES ON HUMANS IN THE VICINITY OF MANUFACTURING FACTORY (1). *(Arumi kojo shuhen ni okeru fukkabutsu ni yoru taikiosen no seitai ni oyobosu eikyo ni kansuru chosa kenkyu (1)). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no 8:41-51 Jan. 1972.*

Effects of fluorides on human and the results of epidemiological studies carried out in Japan, were described. Schoolchildren living near an aluminum factory in Japan were tested as to subjective symptoms, mottled teeth, lung ventilation, x-ray examination of the bones, and fluorine concentration in urine. The incidence of malaise was remarkably higher in schoolchildren from a polluted area. Many schoolchildren of the polluted area showed mottled teeth and osteosclerosis of the knee joint. The amount of fluorine taken into body/day was investigated in fifty 30-60-year-old residents living around the same factory. A farming area within 500 m under the lee of the main wind was determined as a polluted area, and the other farming area over 6 km from the factory was determined as the control. Investigated items were staple foods intake and fluorine intake from them, fluorine intake from subsidiary foods, fluorine intake from drinking water, and excretion of fluorine in urine. Intake of fluorine from staple foods was significantly higher in residents of the polluted area, and its mean value was 2.89 ppm, 40% higher than that of the control. Fluorine taken from the air and the water by residents of the polluted area was suspected to be 0.1 mg higher/day than that by residents of the control area. Fluorine in urine was higher in residents of the polluted area, but the relationship between the intake and excretion of fluorine was not clarified.

20829 APTIC NO. 39240

Vagnoni, Giuliano

LUNG CANCER AND INDUSTRIAL AIR POLLUTION. *(Il cancro del polmone e l inquinamento atmosferico da industrializzazione). Text in Italian. Gazz. Int. Med. Chir., 75(15):1160-1172, Aug. 1970. 28 refs.*

A comparison of the incidence of lung cancer per 100,000 inhabitants during the periods 1950-52 and 1958-60 in countries with different degree of industrial development indicates that the considerable increases may be due to environmental pollution. This is also supported by the statistical finding that while Japan registered a 227.27% increase in the incidence of lung cancer in men (223.33% in women) from 1950 to 1960, the largely agricultural Colombia registered an increase of only 13.63% (and 14.28%). Other statistics indicate that the incidence of lung cancer in urban areas exceeds that in rural areas and that smokers have a much higher incidence of lung cancer than non-smokers. A study performed in various parts of London linked the incidence of lung cancer directly to the pollution level and to the direction of prevailing winds. An analysis of air in various Italian cities revealed that while the atmosphere in Milan contained 987 suspended particles in 1 cu cm air, the corresponding figures for Siena were 133; for Bari, 60; for Bologna, 512; for Varese, 354; for Civiglio, 169; and for Piacenza, 84. The principal carcinogen is 3,4-benzpyrene. Clinical data confirm these findings. Adenocarcinomas, the only type of pumonary cancer which cannot be attributed to chronic irritation of the epithelium of the mucous membrane form only 27.2% of all cases recorded while 72.8% cases can be attributed to modern life.

20830 APTIC NO. 39229

Villar, Thome G.

CONSIDERATIONS ON LUNG CANCER. *(Consideracoes sobre cancro do pulmao). Text in Portuguese. J. Med. (Porto), 71(1409):200, 202- 204, 206-208, Jan. 24, 1970. 50 refs. (Lecture presented at the Faculdade de Medicina de Lisbon, Nov. 3, 1969.)*

The frequency of lung cancer has increased in the past years, due mainly to an increase in lung cancer in men in urban and industrial centers. In Switzerland, an increase of male/female ratios was from 1899, 1/1 to 1961, 9/1. In Portugal, the death rate from lung tumors in 1955 was 5.62% for men and 2.16% for women; in 1962, 8.10% and 2.90% respectively. The present study followed the cohort (group) method. In 660 cases of bronchial carcinomas, while adenocarcinomas vary little, the same is not true of pavement cells and the undifferentiated type. Distribution of different types of carcinoma by cohorts shows for 1870 to 1880, all 0carcinomas, 24; pavement cells, 7; undifferentiated, 3; and adenocarcinomas, 1. Corresponding figures for 1901 to 1920 shows all carcinomas, 165; pavement cells, 69; undifferentiated, 28; and adenocarcinomas, 8. And for the period 1931 to 1940, all carcinomas were 2; pavement cells, 1; undifferentiated 1; and adenocarcinomas 0. To determine the frequency of different types of tumors, 715 cases from personal statistics were used. Among 660 primitive tumors, 611 were malignant, of which 585 were carcinomas. Among carcinomas, the most frequent were the ones connected to exogenous etiological factors. It is a general belief that a given tissue has the greatest malignant potential when the rhythm of the cell renovation is the fastest. However, slow cell renovation rhythm provides more time for cells to suffer the cancerous action, and thus start the transformation. A scheme of the malignant transformation of a cell is given. The possible role of cytoplasm in the transformation of the cell is discussed. The type of tumors are presented according to their apparent point of origin. The role of heredity believed to be secondary, is also considered. Age distribution of lung cancer follows and is shown to be at its height in the age 60-70, especially when the tumor depends on exogenous factors. The distribution of bronchial carcinomas in relation to sex varied with the histological type of tumor. Pavement cell carcinomas were 15 times more frequent in men than in women. The frequency of different types of tumors in 361 patients with lung cancer showed pavement cells, 70% for men and 33% for women. A study of non smokers which eliminated the best known carcinogenic factor showed a disappearance of inequality among sexes; the men of this sample showed the same behavior as the women. A distribution of different histological types of carcinomas according to sex of the nonsmokers is follwed by a discussion of the important (argumentative) of previous bronchial illnesses in the origin of lung cancer.

20831 APTIC NO. 38870

Wagner K, -H. and E. Wagner-Hering

THE METABOLISM OF CARCINOGENIC SUBSTANCES - POLYCYLIC AROMATIC HYDROCARBONS - IN PLANTS AND HUMANS. *(Der Kreislauf der krebserregen den Substanzen - polycyclische aromatische Kohlenwasserstoffe - bei Pflanze und Mensch). Text in German. Protectio Vitae, no. 6:260-266, 1971. 11 refs. (Presented at the Internationalen Vitalstoff-Konvent, 17th Montreux, Switzerland, Sept. 6-12, 1971.)*

Polycyclic aromatic hydrocarbons such as pyrene, benzanthracene, benzo-3,4-pyrene, fluoranthene, benzo-1,2-pyrene, and benzo-1,2-perylene are present in the top soil in high concentrations. The presence of these substances in the soil stems from the air pollution by industrial waste gases and automobile exhaust gases. In exhaust gases, 29.6 micrograms of pyrene, 3.4 micrograms of benzanthracene, 2.4 micrograms benzo-3,4-pyrene, 5.1 micrograms fluoranthene, 1.5 micrograms benzo-1,2-pyrene and 2.5 micrograms benzo-1,2-perylene are found/1000 ccm air. The aromatics contained in the air condense in the rain water and are carried to the ground. Continuous analysis of the rain water in Giessen revealed that benzo-3,4-pyrene and benzo-3,4-fluoranthene were present at all times in average concentrations of 0.004 micrograms benzpyrene/l and 0.6 micrograms benzfluoranthene/1. Plants growing on such soils absorb these substances with their root system and store them. These plants are then ingested by animals and man. It will be necessary to bar all areas in the vicinity of industries emitting such substances from all agricultural use until measures for retention of such pollutants are taken. It has been feasible to separate benzo-3,4-fluoranthene and benzo-3,4-pyrene in considerable concentrations from human carcinoma, preferably in carcinoma of the respiratory tract and the digestive tract.

20832 APTIC NO. 39258

Wiggins, E. J.

STATISTICAL ANALYSES. *In: Studies of Eye Irritation due to Los Angeles Smog 1954-1956. Air Pollution Foundation, San Marino, Calif., p. 68-75, July 1, 1957.*

The variable that shows significant correlations with eye irritation at the largest proportion of stations is the hourly particulate concentration, which is significant for all stations. Following this in descending order are oxidant, total hydrocarbons, daily average particulate concentration, visibility, polycyclic hydrocarbons, carbon monoxide, aldehydes, and the product of temperature and relative humidity. The regression curves relating eye irritation with the concentrations of various contaminants are considered.

20833 APTIC NO. 39281

Wilson, Vera K., M. L. Thomson, and C. E. Dent

AMINO-ACIDURIA IN LEAD POISONING. *Lancet, vol. 2:66-68, July 11, 1953. 14 refs.*

A constant amino-aciduria in lead poisoning in children was investigated. The complete case record, medical examination data, including blood tests and urine chromatography, diagnosis, treatment, and progress of a specific case are discussed. The level of the amino acids in the plasma was normal, suggesting a defect in the renal tubes caused by the lead poisoning.

20834 APTIC NO. 39091

Wilson, William E., Jr., Authur Levy, and E. Harvey McDonald

ROLE OF SO2 AND PHOTOCHEMICAL AEROSOL IN EYE IRRITATION FROM PHOTOCHEMICAL SMOG. *Environ. Sci. Technol., 6(5)L423-427, May 1972. 21 refs.*

Measurements were made with irradiated automobile exhaust and pure organic compounds to determine the influence of sulfur dioxide and photochemical aerosols on eye irritation. Auto exhaust and mixtures of nitrogen oxides and a variety of organic compounds were irradiated in a 610 cu ft smog chamber. Response delay and intensity measurements of eye irritation were made by seven-number panels. The addition of sulfur dioxide, although it increased aerosol formation, produced a decrease in eye irritation with many of the hydrocarbon/NOx systems studied. Sulfuric acid aerosol, produced by the photooxidation of SO2 in clean air, does not cause eye irritation. However, photochemical aerosol, generated from 1-heptene and nitrogen oxides in the absence of SO2, does cause eye irritation. This was demonstrated in one run in which the photochemical aerosol was removed by rapid stirring. The effect of SO2 is not related to changes in aerosol formation but is due to the chemical interaction which modifies the gas-phase products. (Author abstract modified)

20835 APTIC NO. 39502

Yamaguchi, Atsuko, Yoshimura Takesumi, and Kuratsune Masanori

INVESTIGATION CONCERNING BABIES BORN FROM WOMEN WHO CONSUMED OIL CONTAMINATED WITH CHLOROBIPHENYL. *(Enka bifeniru osenyu wo sesshu shite ninpu yori umareta ko ni kansuru shosa). Fukuoka Igaku Zasshi (Fukuoka Acta Med.), 62(1):117-122, 1971. 9 refs. Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., 17p., Jan. 1972. (Presented at the Japan Public Health Association, 27th Congress, Oct. 1969.)*

Mothers who ingested rice oil contaminated with chlorinated biphenyls were observed to give birth to a high percentage of babies with unusually dark skin pigmentation and other abnormal clinical manifestations. In 11 out of 12 cases, the weight at time of birth was less than average, and four cases were small-for-date babies. The chlorinated biphenyls probably inhibited growth during the prenatal period. Black skin symptoms improved within two or three months of birth and the initially below-average birth weights, increased more or less parallel to the standard growth curves, especially in the males. There were no deformities and no retardation of motor or mental functions. (Author conclusions modified)

20836 APTIC NO. 39564

Zaidi, S. H., Ravi Shanker, and R. K. S. Dogra

EXPERIMENTAL STUDIED ON EARLY STAGES OF THE DEVELOPMENT OF PULMONARY SILICOSIS IN PUPS. *Environ. Res., no. 4:243-252, Aug. 1971. 9 refs.*

Airborne dusts are known to produce lung lesions in exposed individuals. The development of lesions in pups is described. Pulmonary silicosis was produced experimentally in pups by intratracheal injection of (250 mg/kg body weight) silicate dust of particle size less than 5 micron. The development of fibrosis was extremely slow in pups. In early periods the distribution of dust particles was chiefly confined to the alveolar sacculations of respiratory bronchioles. In later periods modules were encountered in the vicinity of bronchioles, alveolar ducts, and blood vessels which even at 240 days were composed only of thick, compactly arranged reticulin fibers. The low fibrogenicity of silica dust in pulmonary tissue of pups is attributed to the age factor.

20837 APTIC NO. 39569

Zelac, R. E., H. L. Cromroy, W. E, Bolch, Jr., B. G. Dunavant, and H. A. Bevis

INHALED OZONE AS A MUTAGEN. I. CHROMOSOME ABERRATIONS INDUCED IN CHINESE HAMSTER LYMPHOCYTES. *Environ. Res., no. 4:262-282, Aug. 1971. 117 refs.*

The suitability of lymphocyte chromosome breakage as a biological indicator of exposure to an air pollutant, ozone was studied. This new technique may be useful for other oxidant pollutants. The results provide further reason for considering ozone as a radiomimetic agent. Chinese hamsters were exposed in two groups of four to ultraviolet-generated ozone for 5 hr at 0.2 ppm, these values chosen through preliminary experiments. An additional group served as a control. Exposure-adjusted break frequencies for chromosome aberrations produced in circulating blood lymphocytes were a quantitative indicator of damage. Inhaled ozone produced 1670 breaks/cell (ppm min) agreeing well with data from in vitro exposure of human cells. There was no apparent decrease in break frequency with time for 2 wk posttreatment. Directly extending this animal study to the human case, presently permitted ozone exposures (up to 0.1 ppm, 4 ppm hr/wk) would be expected to result in break frequencies that are orders of magnitude greater than those resulting from permitted radiation exposures. The most important single fact to emerge from this investigation was that inhaled ozone resulted in chromosome aberrations in circulating blood lymphocytes. Because of the body-wide effects of inhaled ozone and the fact that production of chromosome aberrations by ozone appears to be an effect general to all cell types, the lymphocyte results suggest, in a qualitative sense, similar damage to other cells throughout the body. Such aberrations are considered cellular alterations (damage) with long-term consequences. The data from this limited investigation suggest that lowering of the community and industrial limits for ozone would be prudent.

EFFECTS-PLANTS AND LIVESTOCK

20838 APTIC NO. 39469

FERMENTATION INDUSTRIES. WINE, PERRY, AND CIDER: INFLUENCE OF SULPHUROUS ACID UPON THE FERMENTATION PROCESSES DUE TO YEASTS AND BACTERIA IN --. *J. Soc. Chem. Ind., vol. 34:1066, Oct. 30, 1915.*

The action of sulfurous acid upon wine, perry, and cider was investigated by introducing it in the form of potassium metabisulfite into the fermented or partly fermented juice of grapes, pears, and apples After one hour or longer, the amounts of free and fixed sulfurous acid were determined by titration with N/50 iodine solution. During fermentation, the sulfurous acid-aldehyde compound remains unchanged, but the sulfurous acid-dextrose compound is decomposed with the liberation of free sulfurous acid, which however becomes fixed very quickly, and is subsequently oxidized to sulfuric acid. Acetaldehyde produced as an intermediate product, and the aldehyde originally present in the juice, undergoes reduction to alcohol during fermentation. Hence most of the sulfurous acid added remains in the free state, but as the production of aldehyde increases it gradually becomes fixed. As fermentation proceeds the free sulfurous acid becomes oxidized by atmospheric oxygen to sulfuric acid; however, some of it may be fixed by the acetaldehyde formed by oxidation of the alcohol. Only free sulfurous acid has a retarding or inhibiting action upon fermentation. The resisting power of yeasts to this acid differs with different varieties.

20839 APTIC NO. 39145

Ashby, William C. and Harold C. Fritts

TREE GROWTH, AIR POLLUTION, AND CLIMATE NEAR LAPORTE, IND. *Bull. Am. Meteorol. Soc., 53(3):246-251, March 1972. 18 refs.*

A multivariate technique was used to assess tree-ring growth and climatic relationships of white oak in northern Illinois-Indiana with possible correlations to air pollution. Basic data include the time series of annual ring widths and measurements of temperature and total precipitation for Joliet, Chicago, Valparaiso, LaPorte, and South Bend on monthly bases. Climate accounted for 59% of the variance in ring-width chronology and prior growth accounted for 2%. The analysis neither proved nor disproved the precipitation anomaly at LaPorte, a phenomenon of summer convective storms, but suggested that the growth reduction may be a direct result of toxic effects from severe air pollution correlated with high levels of smoke-haze in Chicago. The study of tree rings, therefore, may serve as a record of past air pollution or may be suitable for documentation of anomalies in climate. (Author abstract modified)

20840 APTIC NO. 39777

Ashton, W. M.

NICKEL POLLUTION. *Nature (London), 237(5349):46-47, May 5, 1972. 3 refs.*

Contamination of herbage and soil was investigated on a farm located near a nickel works and subject to emissions carried by prevailing winds. Qualitative examination determined the presence of considerable amounts of nickel with smaller amounts of copper in both herbage (oats, wheat, and grasses) and soil. Pasture herbage had a burned appearance; trees were withered and appeared to be dying. Soil samples established positive reactions for arsenic. Surface contamination opposed to plant content of the pollutants was examined. Washing removed most of the nickel from the leaf surface; washed peeled potatoes had only minute traces of nickel and copper.

20841 APTIC NO. 39098

Ballantyne, David J.

FLUORIDE INHIBITION OF THE HILL REACTION IN BEAN CHLOROPLASTS. *Atmos. Environ., 6(4):267-273, April 1972. 21 refs.*

The Hill reaction (oxygen evolution) of bush bean chloroplasts was inhibited by potassium fluoride within a pH range of 4.8-5.7. No inhibition was detected at higher pH s, and no inhibition occurred at pH 5.6 if the potassium fluoride was injected into a chloroplast preparation with a solution of magnesium chloride or sulfate already added. However, if the magnesium chloride or sulfate was added to a preparation that already contained potassium fluoride, then there was no alleviation of the inhibition. Magnesium appeared to act by reducing fluoride concentrations in reaction mixtures. A decrease in fluoride inhibition at 5.6 occurred when the concentration of potassium chloride was increased. Sodium monofluoroacetate was not as effective as potassium fluoride in inhibiting the Hill reaction. (Author abstract)

20842 APTIC NO. 39493

Blakemore, F.

INDUSTRIAL FLUOROSIS OF ANIMALS IN ENGLAND. *Proc. Nutr. Soc., vol. 1:211-215, 1944. 6 refs.*

Industrial fluorosis was studied in stock in pastures near certain brickworks in England. The sources of fluorine was determined from the examination of the flue gases, detection of fluorine in the atmosphere, and evidence of surface contamination of plants. The severity of the symptoms depended upon the degree to which the herbage was contaminated. The chief sympton of severely affected cattle was lameness. The main histological features were extensive atrophy of the bony tissue and the presence of excessive amounts of asteoid. The fluorine content of the bones ranged within 6000-16,000 ppm. The amount of fluorine in the urine was most valuable in assessing damages.

20843 APTIC NO. 39183

Bossavy, J.

THE ACTION OF GASEOUS FLUORINE COMPOUNDS ON FOREST SPECIES. *(Action des fluorures gazeux sur les especes forestieres). Text in French. National Society for Clean Air, London (England), Itern. Clean Air Congr. Proc., London, England, 1966, p. 193-196. (Oct. 4-7, Paper VI/13.)*

Fluorine pollution-induced damage on woody species and measures to be taken to prevent such damage are reviewed. In leaf-bearing trees, fluorine migrates to the boundary portions of the leaf and produces tip or marginal necrosis as soon as the toxicity threshold is reached. Leaf necrosis is produced in certain species by 0.025 ppm fluorine concentrations in the air. Continuous accumulation if fluorine contents by coniferous species is illustrated by data accumulated during 1963-1965 in France. Thus, one year old needles had 277 mg fluorine/kg dry matter at 900 m altitude, 138 at 1300 m altitude, and 47 at 1520 m altitude; two year-old needles had 635, 200 and 85 mg fluorine/kg dry matter at the corresponding forest sampling points located six to ten km distance from the polluting source. Leaf-bearing trees show a tendency to accumulate fluorine within the same season to a higher extent than the coniferous species. Thus, beech tree leaves may accumulate up to 970 mg fluorine/kg, maple leaves may accumulate up to 675 mg/kg, and oak leaves may gather up to 421 mg fluorine/kg within one season. Despite such elevated concentrations, premature leaf fall seldom occurs. Apparently, the annual leaf fall prevents the accumulation processes occurring in the coniferous species. Long therm effects of fluorine pollution lead to soil alterations which may hamper large forest areas. Accumulation of fluorine bearing dust particles on the ground surface and their further infiltration by rain and snow waters may produce chemical alterations of the superficial soil layer. These alterations include increased acidity which modifies the bacterial flora and produces impairment of calcium and nitrogen mobilization within the vital soil layer. Soil treatment with appropriate salt or alkaline additives as well as continuous fertilizer treatment to increase plant resistance against air pollutants are considered among the essential measures to be taken to prevent these damaging effects. Experimental studies show only partial benefits, limited mainly to young populations, from the application of such procedures. Reference is made to new protective procedures adapted in the USA and Germany, which promise new prospectives for the future.

20844 APTIC NO. 39408

Bovay, Ernest

LEAD DEPOSIT ON VEGETATION GROWING ALONG HIGHWAYS TRAVELED BY AUTOMOBILES. MILK COW FEEDING EXPERIMENTS WITH HAY CONTAMINATED WITH LEAD. *(Les depots de plomb sur la vegetation le long des autoroutes. Essai d affouragement de vaches laitieres avec du foin souille par le plomb). Text in French. Bull. Eidgenoess. Gesundheitsamtes, Beilage B, no. 3:101-117, March 1971. 36 refs.*

Measurements conducted in Switzerland from 1967 through 1970 revealed that vegetation growing along highways contained lead in concentrations in excess of 100 ppm. Although the amounts of lead in vegetation rapidly decrease with distance from the highway, lead can be detected up to a distance of about 100 m. The rate and extent of dispersion of lead particles depended on seasonal orographic and/or meteorological conditions. Lead retention by different plant organs is governed by their nature and composition. Plants with large hairy leaves or leaves with a rough surface accumulate much more lead than plants with smooth leaves. From 35-65% of the plant tissue lead content can be removed by thorough washing, an indication that the contamination consists for the most part in a surface deposit. But plant roots growing in lead-contaminated soil absorb the element, even if present in a relatively insoluble form. In spite of these observations, no symptoms of plant disease or a decrease in crop yield has been noted. High tightly growing hedges of perennials (pine or fir) markedly reduce the dispersion of exhaust gases. Feeding trials with milk cows involving hay harvested along highways demonstrated that a high percentage of the lead ingested with the fodder was eliminated. Some organs like bones, kidneys, and the liver accumulated large quantities of lead (up to 21-fold quantities). After four weeks on the contaminated hay, the lead content in milk quadrupled. The cows ingested 1300 mg lead daily with contamined fodder containing 99 ppm Pb. Toxic symptoms in cattle and horses do not appear until an ingestion level of about 2200 mg Pb/day is reached.

20845 APTIC NO. 39472

Cant, Rodney R. and K. E. Nelson

FACTORS AFFECTING THE CONCENTRATION OF THE SULFUR DIOXIDE IN FUMIGATION ATMOSPHERES FOR TABLE GRAPES. *Proc. Am. Soc. Hort. Sci., vol. 69:240-249, 1957. 9 refs.*

Improved cold storage techniques, combined with the use of sulfur dioxide, now make it possible to market California table grapes all year. However, the quality of table grapes marketed in late winter and spring after a long storage period would be much better if the amount of SO2 could be reduced, yet still be sufficient to prevent decay. A rapid method for withdrawal of air samples from the fumigation atmosphere of table grapes and analysis of these samples to determine SO2 content was applied experimentally. Although satisfactory for comparative purposes, small, unavoidable losses made the method unsuitable for determining absolute quantities of SO2 in the fumigation atmosphere. The rate of disappearance of SO2 from the fumigation atmosphere was only slightly more rapid when the lug boxes were filled with fruit than when they were empty; the rate increased as the ratio of fruit and containers to free space increased, and increased as the moisture content of the containers increased. Fruit precooled before being fumigated showed a higher rate of disappearance of the gas than did warm fruit, owing either to greater moisture in the wood of the containers or to greater solubility of the sorbed moisture for SO2. Barriers to air movement, such as containers and liners, impede air flow to the fruit and thus reduce the concentration-time factor of SO2 exposure. (Author summary modified)

20846 APTIC NO. 39470

Chapman, D. J. and R. D. Tocher

OCCURRENCE AND PRODUCTION OF CARBON MONOXIDE IN SOME BROWN ALGAE. *Can. J. Botany, vol. 44:1438-1442, 1966. 10 refs.*

Quantitative data on carbon monoxide in some brown algae, Pelagophycus porra and Pelagophycus giganteus, are reported and preliminary experiments on the production of CO in the pneumatocyst of Nereocystis luetkeana are described. CO measurements followed the spectrophotometric method of Allen and Root, modified by use of a simplified reaction vessel. Pneumatocysts of Nereocystis will regenerate CO for several days when kept in the laboratory. However, this regeneration will only occur when air is present in the pneumatocysts.

20847 APTIC NO. 39204

Connor, J. J., J. D. Sims, and R. J. Ebens

ROADSIDE EFFECTS ON TRACE ELEMENT CONTENT OF SOME ROCKS, SOILS. AND PLANTS OF MISSOURI. *Missouri Univ., Columbia, Proc. Missouri Univ. Fourth Annu. Conf. Trace Substances Environ. Health, Columbia, Mo., 1970, p. 26-34. 14 refs. (June 23-25.)*

A study to estimate the effect of roadside location on trace element content of rocks, subsurface soils, and vegetation demonstrates that the major effect is that of lead accumulation in vegetation. Soils taken from a few inches depth both near pavement and away from pavement exhibit no significant differences in metal content, including Pb. Some higher trace element contents of bedrock in roadcuts were noted in this investigation, but these are believed to reflect specific geologic conditions rather than general roadside effects. The roadside effect on the Pb content of vegetation reflects mostly automotive exhaust from normal vehicular activity. (Author abstract)

20848 APTIC NO. 39607

Cristiani, H. and R. Gautier

CHRONIC FLUORINE POISONING FROM FOOD. *(Intoxication chronique d origine alimentaire par le fluor). Text in French. Compt. Rend Soc. Biol. (Paris), 1925:139-141, 1925. 1 ref.*

Studies on the toxic action of fluorine contaminated feed on domestic animals are reviewed. Chronic intoxication of cattle raised in fluorine-emitting industrial areas were mistaken for osteomalacia due to spontaneous fractures. The symptoms also persisted with balanced feed. Consequently, the symptoms were caused by fluorine instead of by deficiency of minerals. Fluorine contents above normal were revealed in the bones of cattle poisoned by fluorine. Fluorosis and fluorine cachexia occurring in fluorine-emitting industrial areas could be simulated by means of experimental doses. Minimum doses are required to cause toxic effects, and the time required for the development of cachexia is in proportion to the amount of the doses. Depending on the dose, times of a few weeks or months are required for lethal cachexia to occur. Fluorine concentrations of 1/1000 to 1/10,000 in hay are capable of producing death within a couple of weeks or months.

20849 APTIC NO. 39675

Daessler, Hans-Guenther and Horst Ranft

AERIAL FERTILIZING IN THE SERVICE OF SMOKE INJURY RESEARCH. *(Flugzeugdungung im Dienste der Rauchschadenforschung). Text in German. Wiss. Z. Tech. Univ. Dresden, 15(3):657-658, 1966. 6 refs*

An aerial fertilizing test carried out on smoke-damaged fir and spruce stands is described, the related costs are calculated, and the problems of the evaluation of fertilizing effects are outlined. Aerial fertilization is preferably applied to young forests in diluvial areas. In the fertilizing test, calcium ammonium nitrate and magnesium potash in amounts of 80 and 100 kg/ha were distributed from an airplane with a useful load of 350-400 kg. The flying height was 10 m above the tops of the tallest trees. The fertilizer distribution was measured on foils of 1 sq m on the soil, and a deviation of 35% was found. The widths of distribution were 20 m and 30-40 m for calcium ammonium nitrate and fine magnesium potash, respectively. The total costs amounted to 70 dollars/ha of which 45% were material costs, including the fertilizer itself. The surface-fertilizing would cost 60 dollars /ha, and extra liming 59 dollars/ha. In addition, the distribution was more uniform with aerial fertilizing. Studies are being carried out to determine the effects of fertilizing in smoke-damaged forests, by comparing identical sites with and without fertilization. Tree heights and diameters, as well as shot lengths, are measured.

20850 APTIC NO. 39686

Daines, Robert H.

TWO-FOUR-D AS AN AIR POLLUTANT AND ITS EFFECT ON VARIOUS SPECIES OF PLANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 140-143. 3 refs. (May 3-5, Louis, C. McCabe, ed.)*

Experiments were conducted to determine the symptoms of injury resulting from sublethal exposures to spray of the herbicide 2,4-dichlorophenoxyacetic acid and the plant areas most responsive to the stimulation. Applications of 2,4-D in solution to plant surfaces confirmed that, when applied to growing points, 2,4-D in time causes stunting, distortion, vein clearing, and mottling. Plant susceptibility is markedly influenced by the growth condition of the plant and by environmental factors. Effects on a wide variety of plants are reported. Results of fumigation suidies indicate that the probability of plant injury occurring from the vapors of 2,4-D esters decreases as the length of the chain and the molecular weight increases. From the plant response to the vapors of the cellosolves and carbitols, it also appears that substituting oxygen for carbon in the chain similarly decreases activity through the vapor phase.

20851 APTIC NO. 39038

Eaton, Frank M., W. R. Olmstead, and O. C. Taylor

SALT INJURY TO PLANTS WITH SPECIAL REFERANCE TO CATIONS VERSUS ANIONS AND ION ACTIVITIES. *Plant Soil, vol. 35:533-547, 1971. 28 refs.*

In contrast with the toxicities of sulfate and chloride salts added to substrates, the anions SO4 and Cl were not injurious when accumulated without leaf burning by cotton and tomato plants from atmospheres enriched with sulfur dioxide or hydrogen chloride gases. These results are discussed in terms of cation-enzyme interactions which appear to represent at least a major cause of salt toxicity. Although anions are largely unreactive with enzymes it has long been observed that chloride salts in soil solutions are far more toxic than sulfate salts. Five of seven species have shown nearly equal growth repressions on substrates with 100 me/liter of Cl salts versus 200 me of SO4 salts, each added as 50% sodium. The ion activities of the two solutions were equal and the sum of the cations in the plant saps were similar. The osmotic differentials between the expressed tissue fluids and these substrate solutions were remarkably uniform within species. The downward transport of salts via the phloem is projected to provide for root concentrations which supply ions to the xylem and thereby control the uptake of substrate salts. (Author summary modified)

20852 APTIC NO. 39690

Ebaugh, W. Clarence

GASES VS. SOLIDS: AN INVESTIGATION OF THE INJURIOUS INGREDIENTS OF SMELTER SMOKE. *J. Am. Chem. Soc., 29(7):951-970, July 1907. 4 refs.*

The relative effects of sulfur dioxide and flue dusts in smelter smoke upon vegetation were investigated in the Salt Lake City area to assess the damages due to emission from lead and copper smelters. The concentrations of SO2 were monitored, and the effects of free SO2, sulfuric acid, SO2 in aqueous solutions, and dilute solutions of H2S04 were individually examined. Flue dust samples were analyzed for percent content of moisture, sulfur trioxide, iron, copper, insolubles (silicon dioxide), lead, arsenic, and zinc. Many repeated applications of SO2 in concentrations present in the air of a smelting district were needed to cause injury, the degree of which was dependent on humidity. Solutions of H2S04, if present to the extent of 1.38 g/l or stronger, caused marked corrosion. Solutions of flue dusts sprayed upon plants resulted in very severe corrosion. Soil mixtures containing 20% of the flue dust, when applied to plants, also caused very bad corrosion.

20853 APTIC NO. 39109

Ehrlich, Richard and Sol Miller

EFFECT OF NO2 ON AIRBORNE VENEZUELAN EQUINE ENCEPHALOMYETITIS VIRUS. *Appl. Microbiol., 23(3):481-484, March 1972. 9 refs.*

The effect of nitrogen dioxide on the aerosol survival and biological decay rate of Venezuelan equine encephalomyelitis (VEE) virus and spores of Bacillus subtilis var. niger was investigated. The NO2 concentrations were 0.5, 5.0, and 10.0 ppm at 24 C and 85% relative humidity. The survival of airborne VEE virus disseminated as particles 1-5 micron in diameter was significantly influenced by the presence of 5 ppm of NO2; the biological decay rate increased threefold, and the aerosol recovery and aerosol survival of the VEE virus were significantly lower than at 0.5 ppm or in the absence of NO2. Airborne spores of B. subtilis were not significantly affected by as much as 10 ppm of NO2. (Author abstract mofified)

20854 APTIC NO. 38736

Garber, K. and B. Schuermann

EFFECT AND DETECTION OF AMMONIA EMISSIONS NEAR LARGE STABLES. *(Wirkung und Nachweis von Ammoniak - Immissionen in der Naehe von Grossstallungen). Text in German. Landwirt. Forsch. Sonderh., 26(1):36-40, 1971. 25 refs.*

Ammonia-induced damage to plants is reviewed. Symptoms include the developing of a reddish brown color in the leaves. The darkening of leaves is attributed to the precipitation of tannin. A yellowish-brown color appears first on the needle tips of coniferous species, and then the needles become red in the spruce species. Damage to coniferous species appears to be more severe during the winter and beginning of spring, indicating the contribution of air current temperature and frost dryness to the susceptibility of the species. Deciduos trees show much lower susceptibility to ammonia because accumulation of the pollutant is prevented by their seasonal biology. Included are descriptions of damage to coniferous and ornamental species produced by ammonia coming from ventilators installed in stables. Detection of ammonia in the damaged species can be carried out according to the Bredemann and Radeloff procedure with chloropatinic acid following digestion and 1% sodium hydroxide. The presence of ammonia in the sample is indicated by the appearance of yellow ammonium platinum chloride crystals ((NH4)2 Pt Cl 6).

20855 APTIC NO. 39653

Halbwachs, Gottfried

WATER RUNOFF IN SMOKE-DAMAGED WOOD GROWTH. *(Der Wasserhaushalt rauchgeschaedigter Holzgewaechse). Text in German. Allg. Forstz., no 78:196-197, 1967. 6 refs.*

The similarity of symptoms of smoke damage and drought in spruce gave rise to an investigation of the water distribution in smoke damaged and unaffected coniferous trees. Osmotic pressures were measured in unaffected and smoke-damaged fir needles by means of cryoscope. In normal needles, the pressure was higher at the extremities than in basal parts. In damaged needles, the necrosis of parts with the highest osmotic pressures resulted in reduced water supply. Suction capacities of cut-off branches were studied in an air-tight chamber. They were dependent on local conditions, relative humidity, and transpiration. In intact trees, the suction capacities were more important in higher than in lower branches. In damaged trees, the vertical distribution of these values was different, as well as the absolute values. As the needles are primarily affected by smoke, they are unable to produce the necessary suction force if located on a level exceeding a certain height. Thus, necrosis starts from the top part of the tree including long lateral branches in firs.

20856 APTIC NO. 39328

Haut, Hans van

ANALYSIS OF SEVERAL AIR POLLUTION COMPONENTS WITH KALE (BRASSICA OLERACEA ACEPHALA) AS INDICATOR PLANT. *(Nachweis mehrer Luftverunreinigungskomponenten mit Hilfe von Blaetterkohl (Brassica oleracea acephala als Indikatorpflanze)). Text in German. Staub, Reinhaltung Luft, 32(3):109-111, March 1972. 18 refs.*

Kale (brassica oleracea acephalia) was used for identification of fluorine, chlorine, sulfur, and lead air pollutants. The plants were exposed to the atmosphere at various sites in the Ruhr valley. Plastic boxes with 60 l volume were used for growing the plants. The fluorine concentration was determined by the electrometric method developed by Reusmann and Westphalen, the chloride concentration by the familiar method of potentiometric titration, and the sulfur concentration by the microanalytic method by Stratmann. The lead concentration was determined by inverse-polarographically. For the determination of these components by the mentioned methods only 5 g dry substance are needed. The plants, five in a pot, were exposed over several successive years from the beginning of August to the middle of November. Control plants were exposed outside the Ruhr valley in an entirely emission-free area. The F-level in the plants was in all cases above (with one exception) that of the control plants. It ranged from 4.1 to 20.1 mg/100 g dry substance. In washed leaves, the F concentrations were lower by 15 to 30%. The chloride concentration in the plants from the polluted area was four times the concentration in the control plants, the lead concentration was ten times the concentration in the control plants. The highest sulfur dioxide was 1.83% versus 1.33% in the control plants. The results show that kale serves well as an indicator for the mentioned pollutants, as well as for a number of polycyclic hydrocarbons, including the carcinogenic benzo(a)pyrene.

20857 APTIC NO. 39740

Heilbronn, Alfred

INDUSTRIAL WASTE GASES: PHYSIOLOGICAL ACTION ON PLANTS. *(Ueber die physiologische Wirkung der Industriegase auf Pflanzen). Text in German. Forsch Fortschr., 6(30):392-393, Oct. 1930.*

The possible dependance of pollutant concentration thresholds of environmental factors was investigated on clover, tomato, cucumber, soybean, and Callisia. One group was exposed to a natural industrial air and the other to purified air in two-chamber greenhouses installed in an industrial area. The ventilation was made every 30 min for 15 min. A third group was exposed to industrial air in open area. No smoke damage could be revealed on plants in the greenhouse, and a number of functions were even stimulated in the greenhouse smoke chamber, compared to plants in open air. An increase of 21% (average of 17 days) in the rate of growth was found for Callisia shoots and roots, compared to Callisia cultures in the pure-air chamber. Callisia cultures in the pure-air chamber, fed with water from waste gas cleaning also showed increased rates of growth. Both increased assimilation activity and water runoff were observed in the smoke chamber. The differences in the behavior of smoked and open-air plants may be explained from a number of conditions. The fluctuations between maximum and mininum concentrations were less important in the greenhouse than in the atmosphere.

20858 APTIC NO. 39190

Hoericht, W.

FOREST DEVASTATION FROM SMOKE. *(Waldverwuestung durch Rauch). Text in German. Kranke Pflanze, vol. 15:90-92, 1938.*

The chief sources of gases (sulfur dioxide, sulfuric acid, hydrochloric acid, and hydrofluoric acid) that poison forests are domestic heating, cellulose, and other industry plants. The damages caused to trees by these gases are very different, so no diagnosis can be established. Due to their exposure, lasting for many years, pine woods are more sensitive to sulfur dioxide and other poisonous gases contained in air than deciduous trees. The symptom of the damage is, in general, the reddening of the leaves and needles. Even if the air does not contain harmful gases, the dust and soot deposited on leaves and other organs reduce the respiration activity of the plants. Employing species more resistent to smokes cannot be regarded as a genuine solution to the pollution problem in forestry.

20859 APTIC NO. 39077

Howell, R. K. and C. A. Thomas

RELATIVE TOLERANCES OF TWELVE SAFFLOWER CULTIVARS TO OZONE. *Plant Disease Reptr., 56(3):195-197, March 1972. 6 refs.*

Safflower cultivars were exposed to ozone under controlled conditions to determine their relative tolerance to the oxidant at concentrations of 25 pphm for 2 hr. Of the twelve varieties tested, Frio was highly tolerant and Nebraska-4051 was least tolerant. The symptoms were generally localized chlorotic to necrotic lesions on upper leaf surfaces, with variations in degree of injury according to susceptibility and tolerance. Sensitive safflower cultivars, therefore, may be used as biological indicators for phytotoxicants.

20860 APTIC NO. 39478

Ingram, M.

THE GERMICIDAL EFFECTS OF FREE AND COMBINED SULPHUR DIOXIDE. *J. Soc. Chem. Ind., vol. 67:18-21, Jan. 1948. 12 refs.*

Yeasts were exposed to sulfur dioxide in nutrient solutions with two concentrations of dextrose, chosen so as to induce the same rate of growth in the yeast, but to combine with quite different proportions of the SO2 added. Behavior of the yeast was related to the concentration of free SO2 and to the amounts combined or added. In another experiment, a correlation was demonstrated between the rate of growth of yeasts in concentrated orange juice and the concentration of free SO2, but not with the combined or total SO2; in this experiment, however, larger quantities of free SO2 were involved. Thus the preservative, germicidal action of SO2 is exerted only through the proportion remaining free. (Author abstract modified)

20861 APTIC NO. 39060

Ionescu, Al. and Elvira Grou

ASPECTS OF THE PHYSIOLOGY AND BIOCHEMISTRY OF SOME PLANTS EXISTING UNDER THE INFLUENCE OF ATMOSPHERE POLLUTION. *Rev. Roum. Biol. Ser. Bot., 16(4):263-271, 1971. 10 refs.*

Vegetation of the Copsa Mica zone in Rumania is often visibly affected by noxious elements existing in the atmosphere, in particular by sulfur dioxide. Comparative investigations were undertaken of some physiological and biochemical processes in different culture plants and flora, both in polluted zones and in control zones. Water content, stomata condition, and hydrogen ion concentration in cellular sap were analyzed. Modifications occurred to plants in the polluted zones which were sometimes substantial. A foliar symptomatology and a chromatogram of free amino acids different from that of the controls were obtained in Pelargonium plants exposed to an experimental atmosphere of SO2. (Author abstract modified)

20862 APTIC NO. 39409

Keller, Th.

LEAD RESIDUES IN SYLVAN VEGETATION RESULTING FROM TRAFFIC. *(Ueber verkehrsbedingte Bleiruecksteande auf der forstlichen Vegetation). Text in German. Bull. Eidgenoess. Gesundheitsamtes, Beilage B, no. 3:118-130, March 1971. 16 refs.*

The assimilation organs of conifers lining highways contain lead which increases in quantity with increasing traffic density. The lead content in needles of conifers can serve as an indicator of traffic-induced air pollution. The normal lead content of one-year-old pine needles is about 2-3 ppm. The lead content of needles increases with their age only to the extent that young needles contain less lead than one year-old or several-year-old needles. The lead content increases in the course of the first year of exposure until a local dynamic equilibrium was established. The lead content decreases with height above the highway surface, especially in the lower part of the tree crown up to a height of 10-12 m. Laterally, the lead content decreases in woods lining the highway within the first 50 m faster than in open country. Up to 90% of all lead remains on the surface of the needles and can be washed off with an acid and a detergent solution. The small residual lead content in needles indicates that exhaust gases are probably only seldom the cause of lead-induced damage to vegetation. While gas exchange measurements did disclose a depression of carbon dioxide assimilation with increasing lead content in needles, it seems that the inhibition of photosynthesis is due primarily to the soiling of the needle surface and to the toxic action of the other pollutants emitted by the exhaust gas.

20863 APTIC NO. 39466

Kisser, J.

SMOKE DAMAGES OF FOREST FROM THE BIOLOGIC STANDPOINT. *(Forstliche Rauchschaeden aus der Sicht des Biologen). Text in German. Mitt. Forst. Bundesvers., no. 73:7-48, 1966. 67 refs. (Presented at the Symposium on Smoke Damage to Forests in Austria, Vienna, Austria, Nov. 9-11, 1965.)*

The biological aspects of smoke damage are reviewed with special regard to forests. Due to long exposures, smoke is more harmful to forests than to farm plants. Forest damage is termed as injuries and disfunctions causing economic losses. Invisible physiological damage due to protoplasm lesions is counteracted by the regenerative effect of certain enzyme systems. Insoluble solid emissions reduce both light and assimilation, while soluble particles may penetrate the plant or soil, causing changes in the vegetation. Damage caused by soot and photochemical smog is detailed. Sulfur dioxide and hydrofluoric acid are two basic gaseous pollutants damaging forests. The importance of the damage is primarily determined by concentration and duration of exposure, with emphasis on concentration. In high concentrations, the substances are dissolved in the mesophyll cell wall fluid, causing point-like necrosis. Low concentrations lead to necrosis on the ends and edges of leaves and needles. The basal and end parts of the needles show different osmotic pressures. Due to disturbances in the water supply, the necrosis starts from the top part of the tree. Invervals between intermittent exposures lessen the damage. Damage is also influenced by climatic factors. The assimilation is dependent on light intensity and duration. Transpiration and consequently sensitivity to SO2 are dependent on relative humidity. A sharp increase in sensitivity can be observed from 60 to 90% relative humidity. There is no direct connection between transpiration rate and assimilation performance. High transpiration coefficients are characteristic of dry climates. There is no relation between transpiration and sensitivity, while any factor affecting the cuticular openings influences the extent of the damage. Resistance to smoke cannot be improved in forests by means of fertilizers. Different resistances of various species and individual trees as well as problems of breeding smoke-resistant species are discussed.

20864 APTIC NO. 39474

Kistner, A.

CONDITIONS DETERMINING THE OXIDATION OF CARBON MONOXIDE AND OF HYDROGEN BY HYRODGENOMONAS CARBOXYDOVORANS. *Proc Kon. Ned. Akad. Wetensch., Ser. C, Biol. Med. Sci., vol. 57:186-195, 1954. 8 refs.*

The ability of differently grown cells of the bacterium Hydrogenomonas carboxydovorans to oxidize carbon monoxide and molecular hydrogen was studied. The cells derived from a Knallgas-culture oxidized hydrogen from the beginning at a high rate. Cells from a CO-grown culture were also capable of oxidizing hydrogen, but rather weakly; the rate of total gas consumption, which remained constant during the time of the experiment, scarcely surpassed that of oxygen consumption in endogenous respiration. Cells from a lactate-grown culture were characterized by their ability to oxidize hydrogen with a rate which markedly increased with time. Taking into account the short duration of the experiment, this behavior can only be ascribed to an induced synthesis of a hydrogenase in these cells. Both Knallgas-grown cells and lactate-grown cells were practically unable to oxidize CO, while CO-grown cells bring about this conversion quite satisfactorily. CO oxidation by H. carboxydovorans depends on the presence of a specific catalytic system of a typically adaptive character, in so far that this system is only present in cells derived from cultures in which CO is the sole energy source. The simultaneous oxidation of hydrogen and of lactate surpasses that of each of the single substrates. CO consumption depends on a catalytic system different from the lactate dehydrogenase.

20865 APTIC NO. 39628

Kistner, A.

ON A BACTERIUM OXIDIZING CARBON MONOXIDE. *Proc Kon. Ned. Akad. Wetensch., Ser. C, Biol. Med. Sci., vol. 56:443-450, 1953. 12 refs.*

Present-day knowledge of the microbiological oxidation of carbon monoxide is based on doubtful observations and imperfect experimental procedures. By making use of shake cultures in contact with gas mixtures containing high concentrations of CO and by employing liquid enrichment media with a low content of organic matter and solid media of the same composition with not more than 1.2% agar, it proved possible to isolate a CO-oxidizing bacterium of the genus Hydrogenomonas from sewage sludge. For the first time irrefutable proof has been given for the oxidation of carbon monoxide by a pure culture of a bacterium, both in growing cultures and in resting cell suspensions. (Author summary modified)

20866 APTIC NO. 39475

Lind, C. J. and P. W. Wilson

CARBON MONOXIDE INHIBITION OF NITROGEN FIXATION BY AZOTOBACTER. *Arch. Biochem., vol. 1:59-72, 1942-1943. 7 refs.*

Carbon monoxide inhibition of nitrogen fixation by Azotobacter vinelandii was established in macro total nitrogen experiments. Definite inhibition was observed when the CO concentration was 0.1-0.2%; it increased with the pCO until 0.5-0.6% when fixation was almost completely suppressed. This inhibition is comparable with that of inoculated red clover plants, but the quantity of CO required is about 10 times greater than for the symbiotic system. In the range of CO concentration inhibitory for nitrogen fixation by azotobacter little consistent effect is noted on the assimilation of combined nitrogen, thereby establishing the specificity of the inhibition for nitrogen fixation. Azotobacter cultures kept on a nitrogen-free medium in air required a period of adaptation before they readily use nitrate (or nitrite) and probably asparagine. With the adapted cultures the rate of assimilation of nitrogen sources appears to be: highest, urea and ammonium; somewhat less, molecular nitrogen, nitrate, nitrite, and asparagine; much lower, aspartate and glutamate. (Author summary modified)

20867 APTIC NO. 39631

Lind, Charles J. and P. W. Wilson

MECHANISM OF BIOLOGICAL NITROGEN FIXATION. VIII. CARBON MONOXIDE AS AN INHIBITOR FOR NITROGEN FIXATION BY RED CLOVER. *J. Am. Chem. Soc., vol. 63:3511-3514, Dec. 1941. 8 refs.*

Evidence from experiments in which total nitrogen fixed was estimated, as well as others in which rate of fixation was measured, shows that uptake of free nitrogen by inoculated red clover plants is inhibited by as little as 0.01% carbon monoxide. The fixation process is practically stopped by 0.05% CO. In this range of pCO, no effect on assimilation of ammonium nitrate by uninoculated plants is observed, but at higher concentrations definite inhibition is detectable. The inhibition of nitrogen fixation appears to be reversible and non-competitive. (Author summary)

20868 APTIC NO. 39718

Lipman, C. B. and Frank H. Wilson

TOXIC INORGANIC SALTS AND ACIDS AS AFFECTING PLANT GROWTH. *Botan. Gaz., 55(6):409-420, JJune 1913. 10 refs.*

The physiological effects of copper sulfate, zinc sulfate, manganese sulfate, and sulfuric acid emitted from smelter processes on plant growth were investigated. The plants were actually stimulated by quite considerable quantities of the toxic salts, indicating a much greater tolerance than previously assumed. The limits of toxicity, therefore, must be studied in greater detail to determine what concentrations of the toxic salts will inflict injuries.

20869 APTIC NO. 39477

Loewus, Mary W. and C. C. Delwiche

CARBON MONOXIDE PRODUCTION BY ALGAE. *Plant Physiol., vol. 38:371-374, 1963. 17 refs.*

Carbon monoxide production was demonstrated in Egregia menzies, several other algae, and in the higher plants, Zostera marina and Medicago sativa, by infrared analysis. Compounds involved in the production of CO were separated and identified by ascending chromatography. Oxygen is required for CO production by Egregia menzies. The ability to produce CO is not destroyed by heating the tissues. Properties of a CO-producing compound isolated from a 6-M sulfuric acid hydrolyzate suggest a polyphenolic compound. The instability of this compound in sodium methoxide and other alkaline solutions is characteristic of phenols with o-dihydroxy groups, such as gallic acid and pyrogallol. Sufficient evidence was not found to relate the isolated CO-producing compound to the in vivo process. Chromatographic evidence was obtained to show that the compound was similar to a substance that could be extracted by milder treatment with dilute hydrochloric acid and then hydrolyzed. It is possible that the plant contains this compound and that it is enzymically hydrolyzed before it decomposes further to CO. Accumulation of the hydrolyzed compound would account for the heat stable production of CO. (Author summary modified)

20870 APTIC NO. 39571

Masek, Vaclav

THE INFLUENCE OF FLY DUST FROM COKING PLANTS ON SOME BIOLOGICAL PROCESSES OF PLANTS. *(Der Einfluss des Flugstaubes aus der Kokerei auf einige biologische Prozesse de Pflanzen). Text in German. Gesundh. Ing., 93(3):77-80, March 1972. 17 refs.*

The influence of three typical samples of fly dust from a coking plant on enzymatic reactions, photosynthesis, chlorophyll concentration in leaves of bean plants was studied. The hydrolysis of starch with amylasis and of the albumen with pepsin at 37 C and the inversion of sacharosis by invertase in a buffered environment were also examined. None of the three dust samples showed a signification activity in enzymatic reactions. Applying the dust samples to the leaves of young bean plants reduced the intensity of photosynthesis and the chlorophyll concentration. In aqueous extracts, the dust samples liberated only small quantities of nutrients. Plants which were grown in a dust suspension showed no increase of dry substance and growth rate. A stimulating effect of the dust samples on root growth was determined. A mixing of the dust samples with the soil influenced the accessibility of water to plants.

20871 APTIC NO. 38820

Matsuoka, Yoshihiro, Hisami Yamada, Tsuyoshi Takasaki, Osamu Udagawa, and Toshiro Ono

EFFECTS OF SULFUR DIOXIDE ON PEAR POLLINATION. *(Nashi no jusei sayo ni oyobosu aryusan gasu no eikyo). Text in Japanese. Chiba-Ken Noygo Shikenjo Kenkyu Hokoku (Bull. Chiba-Ken Agr. Exp. Sta.), no. 11:41-46, March 1971. 22 refs.*

Pear trees were fumigated with 0.5 and 0.2 ppm of sulfur dioxide and mist of 1/500 sulfuric acid for 8 hr in a chamber which was modified as an artificial growth chamber with meteorological control equipment. The effect of gases on fruiting and fertilization of pear trees were examined with artificial pollination. A plot was pollinated 1 hr before gas fumigation, B plot was pollinated 4 hr after fumigation, and C plot was pollinated immediately after fumigation. Visible abnormalities and spotted symptoms caused by fumigation were not observed on the plant. In the case of fumigation by 0.5 ppm SO2, injurious effect on fruiting was especially significant in B plot, and was found in all the plots. Fruit shedding was slightly observed with 0.2 ppm SO2 and was more significant in B plot than in A and C plots. When a number of fertilized seeds of young fruit was examined, the mean seed number per fruit was lower in the pear fruit treated by gases than in the controlled fruit B plot which was treated by a high concentration of SO2, had the lowest fertility rate; the mean number of seeds was 5.7.

20872 APTIC NO. 38956

Menser, H. A. and G. H. Hodges

OXIDANT INJURY TO SHADE TOBACCO CULTIVARS DEVELOPED IN CONNECTICUT FOR WEATHER FLECK RESISTANCE. *Agron. J., 64(2):189-192, March-April 1972. 12 refs.*

Thirteen tobacco cultivars developed by the cigar industry for resistance to weather fleck in Connecticut were tested in Beltsville, Md., for their responses to air pollutants. Most of the improved cultivars showed significantly more resistance to ozone than AST-C (Bel-C), a cultivar no longer grown because of its susceptibility to weather fleck. Two-hour fumigations at 10 pphm 03 inflicted less than 10% injury on commercial cultivars. The same dosage injured about 20% of the leaf surfaces of Bel-C. Ozone used at 20 and 25 pphm produced about 25% injury on the two most resistant selections, GC 18 and CCC-L. The same rates destroyed 60-70% of the leaves of Bel-C. Weather fleck evaluations in the field disclosed that photochemical oxidants injured less than 3% of the leaf area of three commercial cultivars, but damaged 55% of the leaf surfaces of Bel-C. The most leaf injury to an improved cultivar was 25%. Improved cultivars displayed less than 20% fleck damage in the first and second harvest primings, compared to 75% damage in the same two primings of Bel-C. (Author abstract modified)

20873 APTIC NO. 39144

Mumford, Richard A., Herbert Lipke, Daniel A. Laufer, and William A. Feder

OZONE-INDUCED CHANGES IN CORN POLLEN. *Environ. Sci. Technol., 6(5):427-430, May 1972. 19 refs.*

The distribution and composition of pollen histones were monitored during the course of ozonation in vivo in experimental studies of corn pollen. Free amino acids increased 50% after exposure to 3 pphm of ozone. Higher levels further enhanced amino acid and peptide accumulation and inhibited germination 40-90%. Total alpha-amino N, free amino acids, and ethanol-soluble peptides increased in proportion to ozone exposure. Amino acid accumulation was greatest for alpha-alanine, glutamic acid, and proline. Reducing and neutral sugars bound to ethanol-soluble peptides decreased. The titer or composition of the sulfur-containing F3 histone did not change. The data suggested that ozone induces the autolysis of structural glycoproteins and stimulates amino acid synthesis. (Author abstract modified)

20874 APTIC NO. 39641

Nelson, K. E.

SOME STUDIES OF THE ACTION OF SULFUR DIOXIDE IN THE CONTROL OF BOTRYTIS ROT OF TOKAY GRAPES. *Proc. Am. Soc. Hort. Sci., vol. 71:183-189, 1958. 12 refs.*

During the past 30 years it has become standard practice in the table grape industry of California to fumigate the fruit with sulfur dioxide soon after it is packed, to control decay caused chiefly by Botrytis cinerea Pers. Since grapes are subject to SO2 injury, only the minimum dosage necessary for decay control should be used. The practical limits of the surface sterilization and residual action of the gas in decay control were studied. The conidia of Botrytis cinerea Pers. required 6-18 hr of saturated moisture conditions at 20 C to infect mature grapes. Subsequently the pathogen was independent of an external moisture supply and unaffected by SO2 when the fruit was exposed to 1.0% SO2 in air for 45 min. The fungus was not eradicated from intact grapes fumigated 8 hr with 1.0-0.7% SO2. A fungistatic effect of the gas was proportionate to the length of exposure period. A 20-minute exposure eradicated the fungus from some open lesions. The free and total SO2 content of berries with open lesions was much higher than was that of intact berries. With time, there was a greater reduction in the amount of free than in fixed SO2 in both intact and broken berries. The rate of spread of botrytis rot in the fruit during storage was not appreciable reduced by weekly fumigation periods longer than 10 min using 0.25% concentration. (Author summary modified)

20875 APTIC NO. 38743

Oelschlaeger, W. and E. Schwarz

SOURCES OF ERROR AND THEIR ELIMINATION IN THE DETERMINATION OF LEAD IN BIOLOGICAL SUBSTANCES BY MEANS OF DITHIZONE. *(Fehler-*

moeglichkeiten und deren Eliminierung bei der Bestimmung von Blei mittels Dithizon in biologischen Substanzen). Text in German. Z. Anal. Chem., 258(3):203-207, 1972. 15 refs.

Dithizone forms with lead a carmin-red primary dithizonate both in weakly acid as well as in alkaline solution. The dithizonate can be easily extracted in chloroform. The extraction from citrate and cyanide containing solutions is complete only from a pH of 9 onward. Citrate is mostly added for prevention of a precipitation of phosphates, and cyanide is added for elimination of interferences of most of the heavy metals reacting with dithizone. The largest interference is caused by Bismuth (Bi). An examination of the average Bi and Pb concentrations of samples from areas with and without emissions revealed that Bi concentrations are generally higher in areas with air pollution than those from areas with none. A Bi separation is not necessary in such cases because the Pb concentration are also markedly higher, e.g., spruce needles from an air polluted area contained 0.19 ppm Bi and 18 ppm Pb, they contained 0.02 ppm Bi and 3 ppm Pb from an area without air pollution. A separation of Bi is required, however, in the case of samples taken from the vicinity of factories processing sulfur-containing ores. The best and quickest method of separation is that using diethylammonium-N, N-diethyldithiocarbamate. For the determination of lead, it should be taken into account that the reagents sodium, ammonium citrate, and hydrofluoric acid are contaminated with relatively high amounts of lead. Pure chloroform is used as a blank solution, since the extracted blank solution is not stable, even in darkness. Sources of error in ashing are also discussed; a method is described which can be carried out rapidly and is reproducible.

20876 APTIC NO. 39684

Plagnat, Francois

MISTLETOE, INDUSTRIAL FUMES AND THE MAURIENNE FORESTS (SAVOIE). *(Gui, fumees industrielles et forets de Maurienne (Savoie)). Text in French. Rev. Geog. Alp., no. 59:326-342, 1971. 23 refs.*

Attention is drawn to the dramatic situation of the fluorine-damaged Maurienne forests. The first damage of these mistletoe forests, consisting of 90% coniferous trees, were observed in 1910 when nearby aluminum production started. The upper limit of the fluorine damage rose successively to altitudes of 1600 and 2200 m, while the attack of mistletoe was unimporant above 1000 1400 m. Now, a forest area of nearly 10,000 ha is affected. The damage caused to mistletoe aggravated by the severe damage due to hydrofluoric acid. The losses due to smoke damage show an increase of 58% in the period 1956-1968, compared to the period 1950-1955. At the same time, production by the nearby aluminum plants increased from 43,000 t/yr in 1954 to 92,000 t/yr. The total fluorine emission is 1820 t/yr. Gas cleaning should be introduced. Irrespective of such steps, however, experiments are being carried out with American smoke-resistant Thuya plicata in a 75 ha-area. Measures by the newly-established Department of Environmental Protection are anticipated.

20877 APTIC NO. 39119

Rasmussen, Reinhold A. and Robert S. Hutton

UTILIZATION OF ATMOSPHERIC ORGANIC VOLATILES AS AN ENERGY SOURCE BY MICROORGANISMS IN THE TROPICS. *Chemosphere, 1(1)):47-50, Jan. 1972. 13 refs.*

The hypothesis that the microbial component and possible certain cryptograms that comprise the phyllosplane and rhizosphere common to leaves, stems, barks, and roots of tropical vegetation are a major sink for the naturally occurring organic volatiles in the air beneath the canopy of tropical forests is examined and extended to suggest the utilization of hydrocarbons by tropical microbial flora to include organic gases in auto exhaust. Studies on the organic volatiles in tropical rain forests determined a lack of terpene hydrocarbons and a growth-promoting property of the organic-water condensate obtained from the freezeout of forest air for mixed wild types of microorganisms. In conjunction with the hypothesis, gas chromatographic analyses of diluted auto exhaust in temperature cycled chambers simulating optimum growth conditions for tropical microbial ecosystems demonstrated that the differences in the rate of disappearance of hydrocarbons in the chambers were real and were related to the presence and activity of the microbial community of the leaf litter within the chambers.

20878 APTIC NO. 39407

Richter, R. H. H. and Ch. Schlatter

THE EFFECT OF LEAD FROM AUTOMOBILE EXHAUST GASES ON DOMESTIC ANIMALS. *(Zur Frage der Wirkung von Blei aus Motorfahrzeugabgasen auf nutztiere). Text in German. Bull. Eidgenoess. Gesundheitsamtes. Beilage B, no. 3:86-100, March 1971. 168 refs.*

The effect of lead inhalation on animals is unknown. The intake of lead with fodder results in an accumulation of lead in the organism, but the quantity of lead absorbed is 5-10 times smaller than that absorbed from inhaled lead (from observation on humans). Cattle, sheep, goats, dogs, and chickens were accidentally poisoned by lead from sources other than automobile exhaust gases; the clinical picture varies from species to species and can sometimes be attributed to lead only with reservations. The lethal dose likewise varies with species, age, condition of gastrointestinal tract, rate of elimination, and the exposure. Cattle is especially sensitive. The lethal dose is 10-100 g compared with 500-750 g for horses, and 10-25 g for pigs. Calves are also especially sensitive. The symptoms of lead poisoning include anemia, reduced erythrocyte and thrombocyte count, loss of weight, loss of milk yield, sterility, cachexia, colic, and epileptic seizures. The principal biochemical change is hematoporphyrinuria. Lead ions interfere with the phosphate metabolism and complete with the calcium metabolism. Lead is stored in bones and can thence be mobilized by an unnatural metabolic situation which suddenly induces acute intoxication. The normal blood content of lead in ruminants is 0.05-0.25 ppm, which can increase to 1.52 ppm without toxic symptoms. All currently availble evidence leads to the conclusion that a daily intake of lead per cow exceeding 50-100 ppm (1-3 g lead) can affect milk production and reproduction and lead to undesirably high levels of lead in milk and meat.

20879 APTIC NO. 39159

Rippel, A.

FLUORIDE INTAKE FROM FOOD. *Fluoride, 5(2):89-91, April 28, 1972. 3 refs. (Presented at the International Society for Fluoride Research, Annual Conference, 4th, the Hague, Netherlands, Oct. 24-27, 1971.)*

In order to evaluate the safety of food grown near a Czechoslovakian aluminum smelter, grain and vegetables were assayed for their fluoride content at varying distances from the smelter during a 10 year period. The fluoride content of green parsley leaves was 11.57 ppm (control 0.66); the roots contained 0.08 ppm (control 0.03) and the outer surface of root contained 0.12 ppm (control 0.03). Relatively little fluoride was found in potatoes. At a distance of 80-130 m in the area of the prevailing winds, the fluoride content of the grain varied within 6.34-19.64 mg/kg. At a distance of 500 m, the fluoride levels of grain were reduced to about 35% and at 1 km to about 15% of these values. Grain cultivated in a circular area with a diameter of 2 kilometers from the source of emission should not be consumed locally but can be exported for use in uncontaminated areas, and fluoride should not be added to drinking water in the vicinity of a fluoride-emitting factory. (Author summary modified)

20880 APTIC NO. 39627

Sette, Nicola

NOTE ON FLUOROSIS. *(Note sur la fluorose). Text in French. Compt. Rend. Soc. Biol. (Paris), no. 98:1094-1096, 1928.*

Symptoms of fluorosis, observed on bovine animals raised in a superphosphate manufacturing plant area, were simulated on guinea pigs. Also sulfuric and nitric acids were produced at this plant. The symptoms were most serious in cattle kept in a stable near the superphosphate store. The guinea pigs fed with the same feed as the cattle died in an interval of 20-50 days after the start of the treatment. The investigations revealed brittle bones, intense congestion in liver, kidney, and adrenal glands, as well as increased volume of the latter. The lesions were primarily characteristic of intense liver congestion. Single inflamed mononuclear cells with congestion and hemorrhagic suffusions were found. The symptoms observed were primarily caused by vapors of sulfuric and nitric acids rather than by fluorine. The bone lesions represented one of the symptoms of acid poisoning only and not the disease proper.

20881 APTIC NO. 39254

Sherwood, C. H., J. L. Weigle, and E. L. Denisen

TWO,FOUR-D AS AN AIR POLLUTANT: EFFECTS ON GROWTH OF REPRESENTATIVE HORTICULTURAL PLANTS. *HortScience, 5(4):211-213, Aug. 1970. 13 refs.*

Experimental techniques are described for concentric circular test patterns with intenional exposure to a 2,4 dichlorophenoxyacetic acid (2,4-D) source at the center. The circle has 12-foot row spacing with discontinuous arcs of equal size throughout. Frost-susceptible plants were given several weeks to become established before the 10 seasonal exposures to 2,4-D were begun in early June. For each treatment with 2,4-D, 8 g of acid equivalent 2,4-D was applied in water to two 4-foot lengths of double-fold cheesecloth 8 in. wide. When replaced weekly, the old cloths smelled of 2,4-D, but tests indicated that then 1% of the active 2,4-D remained. Estimates suggest that the average concentration at the center was in the ppb range. Susceptible plants in the rows close to the source were markedly stunted and deformed, while plants in the intermediate rows tended to show apparent stimulation. In the outer circles (lower exposures), vegetables were larger, less misshapen, and ripened earlier. More fruit was produced and the sugar content was higher. Cabbage was markedly stunted at high exposures and such plants usually died before forming heads. The effects of 2,4-D on virus-infected plants is also reported.

20882 APTIC NO. 39280

Spierings, F.

METHOD FOR DETERMINING THE SUSCEPTIBILITY OF TREES TO AIR POLLUTION BY ARTIFICIAL FUMIGATION. *Atmos. Environ., 1(3):205-210, May 1967. 2 refs.*

An apparatus for testing the susceptibility of trees and shrubs to air pollution in their natural environment is examined. The specially constructed blower does not disturb prevailing climatic conditions because ambient air and the test gas are mixed and blown onto a branch of the tree; the blower is so set up that the branch to be fumigated is near the outlet and between two transparent plastic plates fixed on either side of the outlet. In preliminary experiments with trees fumigated with varying concentrations of sulfur dioxide, the apple and pear trees were susceptible to SO2 and mountain ash, of the deciduous trees, was the most sensitive. (Author abstract modified)

20883 APTIC NO. 39180

Street, O. E., C. H. Sung, and H. Y. Wu

STUDIES ON WEATHER FLECK OF TOBACCO IN TAIWAN. *In: Taiwan Tobacco-Wine Monopoly Bureau and Tobacco Research Institute Annual Report. (Taiwan Yen-Chiu Chuan-mai-chii yen-tsao yen-chii-so nien pao). Taiwan Tobacco-Wine Monopoly Bureau and Taiwan Tobacco Research Inst., Taichung, p. 67-74, 1970. 8 refs.*

Thirty varieties of tobacco were studied for weather fleck due to air pollution. Leaf injury estimates were made at or near plant maturity. Six types of leaf injury were observed. Of these, five represented slight variations of spotting and weather fleck. Havana 142, a cigar binder, was the least damaged variety; Burley 49 was the most severely damaged. The plant was unusally small resulting from ozone injury. Damage to the check variety, Vam-Hicks, was relatively severe. The best of the flue-cured tobaccos was Speight G-3; Burley 21 was the best in the Burley tobaccos. The Md. 64 was the best of the Maryland tobaccos tested. Bel W-3 was not the most severely damaged variety, which did not agree with results obtained in the United States. Otherwise, results of both studies were similar. (Author summary modified)

20884 APTIC NO. 38754

Tomatsuri, Masaru

EFFECT OF HYDROGEN FLUORIDE ON PADDY RICE. *(Suito ni oyobosu fussoka suiso no eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(3):336-342, Dec. 1971. 2 refs.*

The effect of low concentrations of hydrogen fluoride on paddy rice was investigated with respect to HF toxicity and threshold value. Paddy rice was exposed to 2-5 ppm HF gas for 10-40 days. The fluorine content of the leaf blade and fluorine concentration in the air were positively correlated but there was no visible injury to the plants. Even under conditions of 40-day exposure to 5 ppb of HF gas, there was no difference between the fluorine content of the hulled rice, the weight of 100 grains, and the weight of straw of the exposed rice plants and the control plants.

20885 APTIC NO. 39378

Ulrich, B.

FOREST FERTILIZATION AND ENVIRONMENTAL PROTECTION. *(Forstduengung und Umweltschutz). Text in German. Alg. Forstz., 27(9/10):147- 148, March 1972. 9 refs. (Presented at a meeting on Forest Fertilization, May 6, 1971, Bremen, West Germany.)*

The significance of fertilization in forests affected by sulfur dioxide emissions is discussed. The sulfur dioxide is washed out by precipitation in amounts proportional to the actual emissions. Investigations revealed soil sulfur inputs of 18-56 kg/ha yearly, in the form of sulfurous acid, sulfuric acid, or their salts. A close relationship between soil pH and sulfur input in pine forests was determined. Low pH values resulted in high sulfur inputs. The very high sulfur input in the soil under pine, compared to beech, is primarily due to the elevated filter effect of pine for atmospheric SO2. The water membrane covering needles, bark, and dead wood absorbs SO2 from the air following precipitation, forms sulfurous and then sulfuric acid, and is finally washed off by the next precipitation. Thus, the considerable filtration effect of pine results in serious soil acidification. Since the pH values usually lie below 3.5, many nutrients, particularly calcium and magnesium, are washed out. Young plants as well as grass and weeds are adversely affected by the high iron and manganese concentrations, while the H2S04 hydrogen ions are used up by clay particles to release aluminum ions, with percolating waters of poor quality as a result. To prevent losses in production, and impairment in soil quality in pine forests, liming in doses of 2 t of CaO/h, repeated every 35-70 yrs, should be applied.

20886 APTIC NO. 39287

Warren, H. V., R. E. Delavault, K. Fletcher, and E. Wilks

VARIATIONS IN THE COPPER, ZINC, LEAD, AND MOLYBDENUM CONTENT OF SOME BRITISH COLUMBIA VEGETABLES. *Missouri Univ., Columbia, Proc. Missouri Univ. Fourth Annu. Conf. Trace Substances Environ. Health, Columbia, Mo., 1970, p. 94-103. 5 refs. (June 23-25.)*

Samples of many British Columbian vegetables collected from 30 different gardens were analyzed for copper, zinc, lead, and molybdenum. Some vegetables actually had 500 times more Mo than others. Even Zn, which has the most restricted range of the four elements investigated, is 40 times more abundant in some vegetables than in others. Vegetal trace element concentrations that vary from what are becoming to be thought of as normal can usually be explained in terms of the pH, organic content, soil type, climate, topography, degree of pollution, and/or geological background of the related soil. However, some deviations from the normal cannot yet be readily explained. (Author abstract modified)

20887 APTIC NO. 39363

Wei, Ling-ling and G. W. Miller

EFFECT OF HF ON THE FINE STRUCTURE OF MESOPHYLL CELLS FROM GLYCINE MAX, MERR. *Fluoride, 5(2):67-73, April 28, 1972. 8 refs. (Presented at the International Society for Fluoride Research, Annual Conference, 4th, the Hague, Netherlands, Oct. 24-27, 1971.)*

The effects of hydrogen fluoride on soybean leaves fumigated with 40-50 ppb HF were examined. In the cytoplasm the presence of small vacuoles was the first noticeable initial change. The fragmentation of the vacuolar membrane occurred either simultaneously or followed immediately. Lipid-droplet-like globules and numerous vesicles occurred subsequently in the cytoplasm and increased as the injury became more severe. There was a decrease in polysomes and a detachment of ribosomes from the rough endoplasmic reticulum. Free ribosome concentration also decreased as the injury became severe. Mitochondrial modifications involving dilation of outer and cristae membranes followed by reduction of both cristae number and matrix electron density and the disappearance of mitochondrial granules were observed in the chlorotic leaves. Electron dense inclusions accumulated in some mitochondria. The first noticeable change observed in the chloroplast was the presence of clusters of phytoferritin granules within the stroma after only 2 days of fumigation. Alterations in nuclear structures were observed in later stages of injury. Numerous small electron dense particles were found on various types of membranes in cells of severely chlorotic leaves. They were distributed on outer mitochondrial membranes, endoplasmic reticula, dictyosomes, tonoplasts, plasmalemma, nuclear envelopes, and disintegrating organelles and vesicles, but were never observed on membranes of chloroplasts and microbodies. (Author summary modified)

20888 APTIC NO. 39473

Westlake, D. W. S., J. M. Roxburgh, and G. Talbot

MICROBIAL PRODUCTION OF CARBON MONOXIDE FROM FLAVONOIDS. *Nature (London), 189(4763):510-511, Feb. 11, 1961. 9 refs.*

Flavonoid compounds are a potential source for carbon monoxide production by molds. Aspergillus flavus degrades rutin to protocatechuic acid, phloroglucinol carboxylic acid, rutinose, and carbon monoxide, the last-named being derived from carbon 3 of the flavonoid molecule. The extent of distribution of this degradative pathway in microorganisms and the structural requirements for the production of carbon monoxide were determined by comparing the amount of carbon monoxide produced after the growth of microorganisms on various flavonoid compounds. A hydroxyl group in the 3-position is required for carbon 3 to be released as carbon monoxide.

20889 APTIC NO. 39537

Wislicenus, H.

THE ASSESSMENT AND CONTROL OF SMOKE DAMAGE. *(Zur Beurtheilung und Abwehr von Rauchschaeden). Text in German. Z. Angew. Chem (Weinheim), 14(28):689-716, 1901. 16 refs.*

The assessment of smoke damage in a given case involves the gathering of evidence that the damage has indeed been caused by smoke, the rendering of proof of such damage, evaluation of its extent, and the estimation of damage for purposes of indexing. A methodology of smoke damage assessment on crops must include examination of the spot, consideration of other contributory factors (frost, mismanagement), laboratory tests, differentiation between acute and chronic damage, determination of the contributory share of several pollution sources, and the calculation of the actual damage accrued. Normal and abnormally high concentrations of pollutants (carbon monoxide, sulfur dioxide and trioxide, hydrogen chloride and fluoride, chlorine, carbon disulfide, cyanide, ether, gasoline vapors, hydrogen sulfide, and ammonia) in emissions from acid manufacturing plants, glass works, lime kilns, fertilizer plants, brick kilns, ceramic works, paper mills, dye works, sugar mills, the manufacture of explosives, and from railroad locomotives are tabulated, and the physiological effects of the various pollutants on plant tissues, on chlorophyll formation, and on assimilation in crops, deciduous trees, and conifers, and sampling and the analytical detection of sulfur and of fluorine in the samples are reviewed. One way of controlling smoke damage is to desulfurize coal by coking and to recover the sulfur by washing coking gas in an alkaline bath. Another way is to achieve a greater dispersion of emissions in the atmosphere by modifications in furnace and smokestack construction.

EFFECTS-MATERIALS

20890 APTIC NO. 38837

Barton, K., D. Kuchynka, Z. Bartonova, and E. Beranek

THE SPREADING OF SULPHATE NESTS ON STEEL IN ATMOSPHERIC CORROSION. *Corrosion Sci., 11(12):937-942, 1971. 11 refs.*

Radiochemical and microscopical investigations of the behavior of sulfate nests in the course of atmospheric corrosion caused by sulfur dioxide, as well as dissolution characteristics of sulfate from nests containing rusted steel provide a description of the spreading of sulfate nests as a discontinuous process. Periodical cracking of the membrance surrounding the nest causes concentrated ferrous sulfate solution or solid crystal to be expelled, resulting in the formation of new corrosion centers. The electrolytic mechanism of this process is explained with the assumption of anion permeability of the membrance. (Author abstract modified)

20891 APTIC NO. 38884

Kuehn, Martin

PROCEDURE TO BE APPLIED FOR THE PROTECTION OF SANDSTONE-MADE SCULPTURES AND BUILDINGS AGAINST ACID AIR POLLUTANTS. *(Verfahren zum Schutz von Bauwerken und Skulpturen aus Sandstein gegen Zerstoerung durch saerehaltige Verunreinigungen der Luft). Text in German. (Martin Kuehn) W. Ger. Pat. Appl. 2,018, 796. 3p., Nov. 4, 1971. (4 claims).*

A procedure utilizing barium hydroxide water solutions for the protection of sandstone structural surfaces from the corrosive action of sulfuric acid carried by industrial pollutants is described. The free H2SO4 is neutralized following formation of insoluble barium sulfate. The excess barium hydroxide is gradually converted into insoluble barium carbonate by the carbon dioxide available in the air. The two insoluble salts fill the pores of the sandstone structural surfaces and thus prevent further pentration of H_2SO_4. Use of organic bases such as benzidine and/or p,p(prime)-diphenyldibiguanide in water and alcohol or water and acetone solutions may serve the same purpose. Application of anticorrosive coatings on the treated surfaces is recommended.

20892 APTIC NO. 39059

Lange, M.

MATERIAL APPLICATION AND CORROSION PROTECTION AT THE PRODUCTION AND THE USE OF FUEL OILS. *(Werkstoffanwendung und Korrosionsschutz bei der Produktion und bei dem Einsatz von Heizoelen). Text in German. Freiberger Forschungsh. A, no. 503:35-50, 1972. 5 refs.*

Material and corrosion problems during the production of fuel oils from sulfur and vanadium-containing natural oils and the combustion of these fuel oils in industrial furnaces are reviewed. During atmospheric and vacuum distillation of natural oils, the corrosion in the temperature range above 250 C by sulfur compounds and by hydrogen chloride/hydrogen sulfide condensates causes the greatest problems. While the corrosion by sulfur compounds in the preheater and columns can be controlled using chromium alloyed steels, the HCl corrosion remains a problem since no economical solution is available. The injection of corrosion inhibiting additives failed. Duroplastic protective layers seem to be promising. The oxides of sulfur, particularly sulfur trioxide, cause low-temperature corrosion below the acid dew point of sulfuric acid at 160 to 170 C. To avoid SOx, a flue gas temperature higher than the SO_3 dew point must be maintained or the air surplus must be reduced as much as is acceptable for the burner, measurement, and control devices. An addition of SO_3 inhibiting additives is hardly considered efficient in the German Democratic Republic because of the thick incrustations of the heating surfaces. Corrosion experiments to stem high-temperature corrosion were carried out in a tube furnace with a heavy fuel oil throughput of 20 to 40 kg/hr. Steel with about 24% chromium is to be used for furnace parts exposed to temperatures of less than 800 C and austenitic steel with chromium on nickel is used at temperatures above 800 C.

20893 APTIC NO. 39031

Steelman, Clarence, Jr.

USE OF PLASTICS TO CONTROL AIR AND WATER POLLUTION. *Materials Protect. Performance, 11(4):37-40, April 1972.*

Areas of application for plastics in equipment and processes designed to control air and water pollution are reviewed. The importance of plastics, e.g., polyvinylchloride, polyethylene, polypropylene, and teflon, lies in their ability ot withstand corrosion. Plastics, therefore, are in use as construction materials for control devices and process equipment such as ductwork, fume scrubbers, regeneration systems, pumps, and piping exposed to hydrochloric acid fumes and pickling acid in the hot rolled steel strip pickling process in steel mills; tanks for storing sulfuric, hydrochloric, nitric, and hydrofluoric acid mixtures and exhaust hoods and fume scrubbers in the wire, rod, bar, and tube pickling processes of steel mills; in the chrome plating of steel strips; reaction tanks in the electroplating rinse water treatment; scrubbers and scrubber liquid recirculation systems exposed to ammonia gas in fertilizer plants; water jet fume scrubbers used with corrosive fluoride compounds in the production of super phosphate fertilizer; plate separators for the removal of insoluble oils; within water and sewage treatment plants; and fume scrubbers, exhaust fans, ductwork, and stacks within chemical industries.

EFFECTS-ECONOMIC

20894 APTIC NO. 39722

Ashman, R.

FILTERS FOR ASPHALT AND COATING PLANTS. THE ECONOMICS OF TOTAL DRY DUST COLLECTION. *Quarry Manag. J., 54(12):433-438, Dec. 1970. 1 ref.*

The performances and costs of four basic systems of dust control for use in the production of road-making materials are compared: single-stage dry collection, two-stage dry collection, two-stage plus final-stage wet collection, and three-stage total dry collection. The results indicate the justification for 100% total dry collection, not only on the grounds of a cleaner atmosphere and elemination of the sludge disposal problem, but also because it costs considerably less than the dry-plus-wet system. The importance of not exceeding the specified rating of the dust extraction system by arbitrarily increasing dryer throughput is discussed in detail. For efficient drying, the temperature of the outlet gases should not be much above the heated stone temperature. Thus, for a stone temperature of 375 F, the outlet gas temperature should not exceed 400-450 F. The effectiveness of the reverse-pressure filter for sleeve cleaning is discussed briefly.

20895 APTIC NO. 39233

Flesh, R. David

PROPERTY VALUE DIFFERENTIALS AS A MEASURE OF ECONOMIC COSTS DUE TO ODORS. *Preprint, Environmental Protection Agency, Washington, D. C., 17p., 1971. 4 refs. (Presented at the Conference on the Dose-Response Relationships Affecting Human Reactions to Odorous Compounds, Cambridge, Mass., April 26-30, 1971.)*

Based on the subjective nature of odor evaluation and the types of neighborhood, occupant, and property data available, two methods of measuring property value differentials due to odors are presented. One of these, now being tested in the Los Angeles metropolitan area, requires careful selection of an odor-free neighborhood near an odor-affected neighborhood so that any property value differential between the areas may be attributable to the presence of odors. The second method, still untried, requires computation of an average property value differential between two neighborhoods, using secondary data. Following this, discussions would be held with highly qualified real estate appraisers to identify the factors they believe may have contributed to the differential. Adjustments of the computed differential for differences in occupant and property characteristics would be readily accomplished using secondary data. Adjustments for differences in individual neighborhood characteristics, e.g., the presence of odor, would be approached through a survey of homeowners in the neighborhood. To substantiate the validity of the method, it would be necessary to determine whether the opinions of homeowners are representative of the opinions of home buyers and sellers as they negotiate together. (Author summary modified)

20896 APTIC NO. 38886

Grimm, W.

DEVELOPMENT AND PREVENTION OF CORROSIONS AT THE USE OF LIQUID AND GASEOUS FUELS. *(Korrosionserscheinungen und ihre Bekaempfung bei der Verwendung fluessiger und gasfoermiger Brennstoffe). Text in German. Tech. Mitt., 65(3):127-134, March 1972. 11 refs.*

The low-temperature corrosion caused by the sulfur components of fuel, the high-temperature corrosion caused by certain ash components, and the formation of ash incrustations on heating surfaces are discussed. Low-temperature corrosion is usually found in the water and air preheater and along the waste gas paths. It attacks mostly iron material and forms iron sulfates as corrosion products. From the result of numerous examinations, it may be concluded that at higher air surplus in oil-fired furnaces (lambda larger than 1.05 and smaller than 1.2) 2-5% of the total fuel sulfur is converted to sulfur trioxide. At near stoichiometric combustion (lambda less than 1.03) the SO3 concentration in the combustion gas is so small that no low-temperature corrosion occurs. At lambda of more than 1.20 the conversion rate of SO2 to SO3 also goes down. About 1/3 of the SO2 is converted sulfuric acid. The remaining SO2 is carried into the atmosphere with the waste gas. Because of the unreliability of dew point measurements for monitoring low-temperature corrosion, the precipitation of the SO3 contained in the waste gas and its determination by titration is often used. Methods for the prevention of low-temperature corrosion such as additives, fuel desulfurization, and prevention of the SO3 formation are discussed.

20897 APTIC NO. 39414

Jimeson, Robert M.

AIR POLLUTION CONTROL COST-EFFECTIVENESS MODEL. *AACE (Amer. Assoc. Cost Engrs.) Bull., 13(3):7-17, June 1971. (Presented at the American Association of Cost Engineers Annual Meeting, Pittsburgh, Pa., July 3, 1969.)*

Computer models that simulate the situation in an air quality region can be valuable in performing the provisions of the 1963 Clean Air Act that require states to establish air quality standards and to formulate control plans. For example, they can be used to provide a complete picture of the spatial distribution of ambient pollutant concentrations, and to assess the impact of alternate control strategies on air quality in the region. One model under development is the Regional Air Pollution Analysis model, which is currently applicable to sulfur oxides, particulate matter, and carbon monoxide from stationary sources. RAPA is composed of a number of individually well-developed submodels linked together to permit comprehensive regional analyses. The operational logic of RAPA, the interrelationship of its various submodels, and the control cost-effectiveness submodel are discussed. The control cost-effectiveness model matches all the applicable control measures to each type of point source existing within the region, and then it calculates the expected efficiency of pollution reduction for each source-device combination. Next, it calculates an estimated annualized cost for each combination and, finally, generates output records for use either internally in the computer by the other models or for visual inspection by the user.

20898 APTIC NO. 38782

Leitner, G. L.

ONE AND ONE-HALF BILLION AUSTRIAN SHILLINGS FOR ENVIRONMENTAL PROTECTION. *(1.5 Mrd. Schilling fuer den Umweltschutz). Text in German. Allgem. Prakt. Chem. (Vienna), 23(1/2):21, 1972.*

The industry is not the only one to blame for the pollution of the environment. Thus, it cannot be asked to improve the environment alone. The individual consumer must do his share too. The industry is doing its share, as seen by the example in Hoechst. The pharmaceutical company there possesses more than 600 cleaning plants. The yellow plumes that are emitted by a 130 m high stack stem from the burning of ammonia for the production of fertilizer. During this combustion red/brown nitrogen gases develop which are cleaned in scrubbers from which nitric acid is obtained. A small residual amount of these gases is far below the permissible tolerance limit and is discharged into the atmosphere where it causes the yellow color of the plume. This could not be changed even if further cleaning stages were added. It would also raise the costs of cleaning to intolerable proportions.

20899 APTIC NO. 39271

Mammarella, Luigi

AMBIENT AIR POLLUTION AND ITS CONNECTION WITH URBANIZATION AND THE MICROCLIMATE OF URBAN AGGLOMERATES. *(L Inquinamento ambientale e i soui rapporti con l assetto urbanistico e la micrometeorologia deli agglomerati urbani). Text in Italian. Consiglio Nazionale delle Ricerche, Rome (Italy), Inst. di Fisica dell Atmosfera, Rept. IFA-RDP 34, 10p., Dec. 1970. 2 refs.*

An assessment of environmental economic damage in Italy disclosed that while water pollution damage ran to $8 million, air pollution ran into over $20 million in the past year. In cities, the microclimate, the topography, the layout of streets, squares, and buildings all have a bearing on air pollution. Drinking water consumption in Italy, a living standard indicator, increases by 3% a year; a direct correlation exists between this increase and the volume of waste water to be disposed of. Water pollution in turn pollutes both the soil and the air through secondary aerosols (seashore) and thus damages the economy and not seldom public health. The principal sources of urban air pollution are domestic heating furnaces and vehicular traffic in the form of particulates, aerosols and gases from auto emissions, sulfur dioxide, nitrogen oxides, carbon monoxide, and hydrocarbons. Only planning and legislation can control the situation. Law 615 which proved beneficial in reducing pollution from domestic heating should be extended to industries and automobiles. The damage from air pollution in Italy has been estimated to run to $56 million, and of this amount $16 million is attributed to damage to human health. Thus the damage caused amounts to $32 per urban dweller. There is a demonstrable correlation between air pollution and urban architecture. It is an accepted fact that traditional urban centers have the highest level of pollution in the lower atmospheric strata. While fine particulates and gases tend to rise to higher levels as a result of turbulence, they end up in the lower atmosphere. In the future, city planning will have to provide for ample open spaces to facilitate air movement and thus a better dispersion of pollutants.

20900 APTIC NO. 39343

Myers, Phillip S.

CAN YOU AFFORD (NOT) TO BREATHE? Automotive Eng., 80(4):20-27, April 1972. 4 refs.

A cost-economics approach to air pollution control, with specific application to automotive emissions, is reviewed. Given the need for a specific reduction, a rational and logical series of steps might include the removal of pollutants with the lowest removal cost, a slow progress up to the sources that have a higher cost, and the implementation of standards that are challenging but still allow for research and orderly development. The cost of pollution controls for hydrocarbons, carbon monoxide, particulates, and nitrogen oxides is examined. Further steps to prevent operation on the high-cost portion of pollution removal curves might require specialized cars to have stricter emission controls in highly polluted regions, make internal adaptations to the spark-ignition engine, develop new power sources resulting in less pollution, reassess the individual transportation-cost relationship, and design control procedures so that control of emissions becomes a part of the system of economic competition. The possibilities of achieving these goals with engine design and operation modifications, catalytic mufflers, gas turbines, or steam engines along with research and development programs, are considered.

20901 APTIC NO. 39487

ODonnell, J. J. and A. G. Sliger

AVAILABILITY OF LIMESTONES AND DOLOMITES. (FINAL REPORT). *Kellogg (M. W.) Co., Piscataway, N. J., Research and Engineering Development, Office of Air Programs Contract CPA-70-68, Task-1, Kellogg Rept. RED-72-1265, 248p., Feb. 1, 1972. 59 refs.*

NTIS: PB 206963

The location of deposits, production rates, quarry costs, transportation method and costs, expected cost increases, uses, chemical composition, and physical properties of limestone, dolomite, chalk, marble, marl, and shell were presented. Enormous deposits of carbonate rocks occur in the United States, and are more than adequate for the future. A very rough approximation of surface carbonate deposits indicates a minimum of 3.6 times 10 to the 12th tons, sufficient to satisfy national requirements for more than 500 yrs at the present rate of consumption. The major deposits of carbonate rocks occur in the eastern half of the United States, where the vast majority of fossil fuel-fired power plants are located. Relative to the potential demand for carbonate rocks by power plants, production of these materials is quite large in most states. However, current production is inadequate to supply the potential needs of power plants in several Atlantic coastal regions, notably, New England. Limestone is the only type of carbonate rock which is produced in large enough quantities to merit consideration for widespread application in the removal of sulfur oxides from stack gases. Most of the power plants in the eastern half of the United States could be supplied with high calcium limestone at less than $6/ton. Many could obtain stone at less than $4/ton. Costs for power plants in the western states would be higher, owing to the lack of suitable, nearby deposits and other factors. (Author summary modified)

20902 **APTIC NO. 39015**

Osawa, Etsuji, Hiroshi Ogawa, Mitsuho Uchida, and Kannosuke Saito

ENVIRONMENTAL DISRUPTION CONTROL AND ITS ECONOMIC EFFECTS, CASE STUDY OF THE AIR POLLUTION BY FUEL OIL. *(Nenryo yu no teiiouka taisaku to sono keizai koka). Text in Japanese. Denryoku Kenkyusho Keizai Kenkyusho Kenkyu Ripoto (Rept. Econ. Res. Inst.), no. 2:1-53, Feb. 1971. 5 refs.*

Air pollution by sulfur dioxide which resulted from the use of fuel oil was discussed. Using a linear programming model, anti-pollution policy to lower the sulfur content of fuel oil and its economic effects within the framework of the petroleum products market were studied. The model was prescribed into a form to minimize the entire cost for environmental disruption control under such conditions as supplying the nationwide demand for liquefied petroleum gas, naphthas, gasoline, kerosene, and heavy oil, and the demand for heavy oil for thermal power stations use as well as for general use. The model also noted the environmental standard for sulfur oxides in each area and the limitation of various techniques and resources. Studies were made on the entire cost for environmental disruption control, the volume of investment in the facilities, the volume of import, shadow prices of the products, and the share of relative costs of electricity projects. Considering the factors and parameters related to the condition, calculation was made for the standard case and also for various cases making 1973 the subject year. Comparative studies with the standard case were made on the transition of demands, and economic effects related to burning crude oil, extraction of sulfur from smoke, free import of petroleum products, and changes of environmental conditions. It is necessary to make simulated studies on environmental disruption control according to the economic effects. It was concluded that burning of crude oil was the most desirable environmetnal disruption control method.

20903 **APTIC NO. 39638**

Perry, Harry

EXTRACTION OF SULFUR FROM FUELS. *Preprint, American Assoc. for the Advancement of Science, Washington, D. C., 21p., 1970. 7 refs. (Presented at the American Association for the Advancement of Science, Chicago, Ill., Dec. 26, 1970.)*

Consumption of fossil fuels for all uses is expected to rise sharply by the year 2000 despite the rapid growth in the use of nuclear fuels for generating electricity. Annual consumption of coal is expected to be 830 million tons, petroleum 10 billion barrels, and gas 41 trillion cu ft, up from the current levels of 510 million tons, 5.1 billion barrels, and 20 trillion cu ft, respectively. The occurrence of sulfur in coal, petroleum, and natural gas is discussed, as well as sulfur supply and demand. The abatement of sulfur oxide emissions as a source of sulfur is considered. Methods and costs of sulfur oxide control are indicated, including stack gas scrubbing with limestone and processes for removing sulfur from the synthetic gases which are made when coal is used to produce either liquid or gaseous synthetics. Use of by-product processes may be limited by the demand for sulfur and sulfur products which, if they cannot be sold, could seriously affect the economics.

20904 **APTIC NO. 38952**

Young, Richard A.

IS THERE A POLLUTION CONTROL INDUSTRY? Pollution Eng., 4(2):59-62, March-April 1972.

The President s Council on Environmental Quality has reported to Congress that more than $105 billion will be spent during 1970-1975 for cleaning up the environment. However, only air and water pollution and solid waste were analyzed. The noise control market will add another $1.5 billion to the pollution control market in 1975. Survey results indicate that the man responsible for industrial pollution control is generally an engineer. A step-by-step procedure which most engineers follow in analyzing and solving a problem is outlined. Specialized engineering societies and manufacturers associations are needed to build a base of information and there must be a major trade publication by which information is exchanged among these groups. Finally, the industry needs a public forum to show its products, as provided by major trade shows and expositions.

STANDARDS AND CRITERIA

20905 **APTIC NO. 38758**

EPA LIKELY WON T DELAY LEAD-OUT TARGET. *Oil Gas J., 70(3):56, 58, 59, Jan. 17, 1972.*

Refiners appear to stand little chance of getting a 1-year reprieve in the planned requirement to remove lead from the grade of gasoline by July 1, 1974. An unleaded regular grade of gasoline will be needed, according to the Environmental Protection Agency, to acheive a 90% reduction in emissions of hydrocarbons and carbon monoxide from new autos. EPA believes that the virtually pollution-free car can be achieved only by use of catalytic mufflers, and the mufflers will not work with leaded gasoline, which poisons the catalyst. Evaluation of the prospects for meeting the emissions deadline concluded that the necessary technology was not available. Delay consequences, emissions of nitrogen oxides reduction, and alternative engines are mentioned. The stratified-charge and Wankel engines have been suggested as possibilities for meeting 1975 emission standards.

20906 **APTIC NO. 38865**

Japan Environmental Agency, Tokyo, Bureau of Atmospheric Safety

REVISION OF SULFUR OXIDES EMISSION STANDARDS. *(Io sankabutsu no haishutsu kijun no kaisei ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 8(1):6-10, Jan. 1972.*

The recent revision of the sulfur oxide emission standards was made in accordance with the regulations set forth in the Air Pollution Control Act. The general emission standards were made much more stringent in all areas. Twenty-five additional regions were reclassified as air quality control regions from those designated as the other regions, with higher standards than heretofore required; and the boundaries of 18 of the already existing air quality control regions were expanded. In the effort to achieve a higher level of special emission standards, the rates of K equals 2.92, 3.50, and 5.26 (three categories grouped by regions) from the formerly straight rate of K equals 5.26 were required. A number regions requiring special emission standards were added, and the boundaries of regions already so designated were expaned. The revised standards will become effective as of Jan. 5, 1972. However, the enforcement of the penalty aspects of the laws shall be waived until March 31, 1972.

20907 APTIC NO. 39526

Cyrankiewicz, J.

ORDINANCE OF THE COUNCIL OF MINISTERS OF SEPTEMBER 13, 1966 ON THE ALLOWABLE CONCENTRATION OF SUBSTANCES IN THE ATMOSPHERE. *(Rozporzadzenie rady ministrow z dnia 13 wrzesnia 1966 r. w sprawie dopuszczalnych stezen substancjiw powietrzu atmosferycznym). Dziennik Ustaw (Warsaw), no. 42:403-404, Oct. 8, 1966. Translated from Polish. 4p.*

Maximum allowable concentrations are designated under normal and special conditions for sulfur dioxide, sulfuric acid, nitrous anhydride, hydrogen sulfide, carbon monoxide, gasoline, and non-toxic particulates. A specially protected area includes resorts, national parks, and land preserves. Protected areas include the remaining lands of the country, excluding land occupied by factories and other sources of pollution. The average daily allowable concentration for SO_2 in protected areas is 0.35 mg.cu m; 0.1 mg.cu m, H_2SO_4; 0.2 mg/cu m, N_2O_3; 0.02 mg/cu m, H_2S; 0.015 mg/cu m, carbon disulfide; and 0.2 mg/cu m, non-toxic particulate smaller than 20 micron in diameter.

20908 APTIC NO. 39224

Grace, T. M.

RECOVERY BOILER PERFORMANCE TEST STANDARD. *Technical Assoc. of the Pulp and Paper Industry, New York, Tappi Eng. Conf., 25th, Proc., Denver, Colo., 1970, p. 421-436. 1 ref. (Oct. 28, Paper 10-6.)*

A new Recovery Boiler Performance Test Standard was developed to replace to obsolete Sulphate Recovery Thermal Code. The standard is based on an elemental analysis of black liquid to establish quantities of heat and material per unit time within the recovery envelope. The purpose of this standard is to establish procedures for conducting tests and preparing material and energy balances to determine capacity, thermal, and chemical performance, and related operating characteristics of sodium-base chemical recovery units used in kraft pulping. (Author abstract modified)

20909 APTIC NO. 39071

Hosey, Andrew D.

PRIORITIES IN DEVELOPING CRITERIA FOR BREATHING AIR STANDARDS. *J. Occup. Med., 12(2):43-46, Feb. 1970. (Presented at the Industrial Hygiene Foundation, Annual Meeting, 34th, Pittsburgh, Pa., Oct. 14-15, 1969.)*

Breathing air standards may be defined as the limits of impurities allowed in cylinders of compressed air used for scuba diving or for self-contained respirators. The establishment of priorities for developing criteria upon which standards can be based to prevent or reduce occupational illnesses is considered. Following numerous discussions with the Bureau of Occupational Safety and Health staff and conferences with other persons in state and local agencies and private industry, the Bureau developed a system of establishing priorities based on the use of five indices that were rated on a scale of 9 to 1, nine representing the greatest and one, the least. These indices include a population index, (PI) relative toxicity index (RT), incidence index (II), quantity index (QI), and trend index (TI). Ratings from the five indices were individually tabulated for each agent. These criteria can be applied to occupational exposures as well as compressed air uses. An overall rating for each agent was obtained by weighting the five indices according to the formula: 2PI plus 2RT plus II plus QI plus TI divided by 5. With these indices and this system, 183 chemical and physical agents were rated.

20910 APTIC NO. 38913

Jones, Allen R. and Richard S. Brief

EVALUATING BENZENE EXPOSURE. *Am. Ind. Hyg. Assoc. J., 32(9):610- 613, Sept. 1971. 5 refs.*

A procedure was devised that permits occupational benzene exposure data to be compared with the three American National Standards Institute exposure limits -- peak, ceiling, and time-weighted average concentrations. For most industrial operations, the vapor concentrations closely follow a log-normal distribution. Accordingly, the sampling data are plotted on log-normal probability paper using Larsen s convention. A line of limiting exposure is constructed on the same plot, and a visual comparison is made for compliance. Plotting values for the limiting line of acceptable exposure are given for sampling periods of 10-240 min. A numerial example that illustrates the evaluation procedure is included. (Author abstract modified)

20911 APTIC NO. 39589

Krotov, Yu. A.

USE OF CALCULATION METHODS FOR THE TENTATIVE DETERMINATION OF THE SINGLE TIME MAXIMAL PERMISSIBLE POLLUTANT CONCENTRATIONS IN THE ATMOSPHERE. *(Primeneniye raschetnykh metodov dlya ustanovleniya orientirovochnykh maximalno razovykh predelno dopustimykh kontsentratsiy atmosfernykh zagryazneniy). Text in Russian. Gigiena i Sanit., 36(12):8-12, 1971. 5 refs.*

An attempt to apply the computation procedures for determination of maximum allowable concentrations of noxious substances used by industrial toxicology, to communal hygiene is presented. Correlation coefficients between reflex thresholds including olfactive, visual, or bioelectric activity of the brain cortex and maximum allowable single exposure concentrations, on the other hand, were deduced. The reflex threshold was used as a criterion for the MAC in the communal atmosphere while the toxicity or resorption threshold constituted the criterion applied in industrial toxicology. Correlations between olfactory thresholds and single exposure MAC for 82 substances, between eye sensitivity and MAC for 54 substances, and between bioelectric brain cortex susceptibility and MAC for 66 substances allowed to develop four empirical equations for the determination of atmospheric MAC utilizing the criterion of reflex susceptibility. The odor perception criterion appeared to be the most convenient in quick computation of MAC values for communal atmospheric hygiene purposes. Upon conversion of the linear empirical equation into graphs, tentative MAC values can be deduced with no requirement of mathematical computation.

20912 APTIC NO. 38944

Liese, Walther

ENVIRONMENTAL PROTECTION - REGULATORY PRINCIPLE FOR THE STATE AND SOCIETY. *(Umweltschutz - staatliches und gesellschaftliches Ordnungsprinzip). Text in German. Gesundh. Ingr., 93(3):66-71, March 1972. 21 refs.*

If soil, water, and air are to be protected, standards are required and enforcement is required. It is somewhat easier to create standards for water and soil than for the air. It has been impossible to set up an objective tolerance limit for odors. Lahmann and Koerner set the tolerance limit for hydrogen sulfide to 0.04 mg/cu m; Russian experts set it to 0.007 mg/cu m. Pollution sources include traffic (60%), industry (18%), power plants (13%), domestic heaters (6%), and refuse disposal (3%).

Knowledge of the acute and chronic effects of certain pollutants in the air lead to the creation of maximum allowable working place concentrations which are constantly being revised. For environmental protection, the maximum allowable concentration has no value, which lead to the creation of maximum allowable emission concentrations. The latter must be lower than the maximum allowable working place concentrations, because they must take into account the entire population, since it is assumed that air pollution is ubiquitous, and includes changing short-and long-term concentrations. Present maximum allowable emission values and maximum allowable working place values have the following relationship: for sulfur dioxide 0.4/13.0, hydrogen sulfide 0.15/15.0, nitrogen dioxide 1.0/9.0, respectively. On the international level, several organizations have been created for coordination of environmental pollution problems.

20913 APTIC NO. 39191

Teisinger, J.

THE PHARMACOLOGICAL ASSESSMENT OF MAXIMAL PERMISSIBLE CONCENTRATIONS. *(Farmakologicky zpusob ocenovani maximalne pripustnych koncentraci). Text in Czech. Pracovni Lekar. (Prague), 015(2):48-51, March 1963. 13 refs.*

In the case of some industrial poisons whose absorption, excretion, and metabolism by the organism are known, maximal permissible concentrations in the atmosphere can be assessed from the total amounts of the poisons absorbed. Evidence is given on lead, trichloroethylene, and benzene that the internationally recommended maximal permissible concentrations of these substances are too high. On the basis of experimental inhalations of aerosols containing lead oxide particles of a median diameter of 0.05 micron in concentrations of 0.075 and 0.150 mg/cu m (of which 30-50% was absorbed in the lungs), the conclusion is reached that the current American MAC of 0.2 mg/cu m may be harmless for short exposures but will cause mild plumbism under conditions of long-term exposure. Experimental inhalations of 500 to 1300 micrograms/l trichloroethylene, of which 56% was absorbed, disclosed that the MAC should be between 100-200 micrograms/l (20-40 ppm) instead of the American MAC of 1050. The Soviet MAC was recently reduced to 0.01 mg/l (4 ppm). Benzene is absorbed by the organism by about 50%. While the current American MAC is 80 micrograms/l, the MAC proposed in the USSR and already in force in Czechoslovakia is 50 micrograms/l.

LEGAL AND ADMINISTRATIVE

20914 APTIC NO. 38757

EPA RELEASES LEAD PHASEOUT PROPOSAL. *Oil Gas J., 70(9):38-39, Feb. 28, 1972. 2 refs.*

The Environmental Protection Agency has published proposed regulations aimed at a 60-65% reduction in the use of lead additives in motor gasoline by mid-1977. Marketers will be required to offer a lead-free, phosphorus-free grade of at least 91 research octane number at stations accounting for about 80-85% of sales in the U. S. EPA concluded that additives will interfere with catalytic mufflers likely to be used to meet emission standards for 1975 and 1976 model autos, and also that atmospheric lead above 2 micrograms/cu m, averaged over a period of 3 mo or longer, constitutes a health hazard. Costs are mentioned, as well as the objections to the proposed regulations.

20915 APTIC NO. 38881

Hyogo Prefectural Office (Japan) and Amagasaki Municipal Pollution Control Center (Japan)

AGREEMENT ON PUBLIC NUISANCE CONTROL. *(Kyoteisho). Text in Japanese. 13p., Feb. 1972.*

The agreement that will be concluded between Hyogo Prefecture, Amagasaki City, and the enterprise concerned for the purpose of air pollution control to protect the health of Amagasaki residents is discussed. The agreement is accompanied by the detailed by-law statement. The agreement comprises 15 articles providing for the basic rules on pollution control measures; emergency measures; consultation on installation or establishment of new facilities; measures and reporting required at accident; measuring and reporting; authority to enter and inspect; responsibility of the enterprise for those working in connection with the enterprise s activity; grievance disposal and compensation; cooperation toward pollution control measures; cooperation of the prefecture and city; environmental rearrangement; setup of council; measures to be taken against violations; detailed by-laws of the agreement; and others. The enforcement date of the Agreement is April 1, 1972. The by-laws consisting of seven articles stipulate the criteria and other detailed procedures that should be observed to achieve the end of the Agreement. Measuring methods designated under Article 6 include sulfur oxides and dust measurements, the atomic absorption method, and absorption spectrometry and polarography for harmful substances such as cadmium, chlorine, and hydrogen chloride. The 76 factories having entered into this agreement are shown.

20916 APTIC NO. 38894

ENVIRONMENTAL PROTECTION IN SWEDEN. *(Umweltschutz in Schweden). Text in German. Wasser Luft Betrieb, 16(3):84-85, March 1972.*

As a preparatory step for the United Nations Conference on the Human Environment in June of this year in Stockholm, Sweden presented its report on the human environment. According to this report Sweden watches the sulfur dioxide pollution most closely primarily because of the increasing acidity of precipitation in Sweden. The main pollution sources in Sweden are traffic, industry, heaters, power plants, and incinerators. The maximum allowable concentration of sulfur in fuel oil is 2.5% by weight. A further reduction to 1% has been initiated in the large cities and will go into effect in the entire country by 1980. Limitations of the exhaust gas emissions also exist reducing the carbon monoxide and hydrocarbon emission by more than 40%. The total investments the industry in Sweden will be pumping into pollution control over the period 1971 to 1975 will be 260 million dollars.

20917 APTIC NO. 38965

A MEMORANDUM ON POLLUTION COUNTERMEASURES OF TOHOKU ELECTRIC POWER COMPANY, LTD. NEW SENDAI THERMAL POWER PLANT. *(Tohoku Denryoku Kabushiki Gaisha Shin-Sendai Karyoku Hatsudensho no kogai taisaku ni kansuru oboegaki). Text in Japanese. Kogyo Ricchi (Ind. Location), 10(12):63-65, Dec. 1971.*

In agreements reached between an electric power firm and various local governments, on the proposed construction of the New Sendai Thermal Power Plant in Sendai City, the company assumes responsibility for erection of a collective-type 180-meters stack, keeping the stack gas temperature at 140 C and emission velocity at 30 m/sec, using crude oil of 2 to 2.2% sulfur content and switching to oil of 1% sulfur content in case of emergency, the use of electrostatic precipitators in the boiler flues, establishment of monitoring system, and future installation of a stack gas desulfurization system. In case of emergency, the company will cooperate with the prefecture, cities, and townships included in the signed agreement, and when it is recognized that the power plant is responsible for damaging the environment, the company will immediately comply with the local government requests and attempt a solution. The company will report periodic measurements of stack gas concentrations and fuel sulfur content.

20918 APTIC NO. 38992

Osaka Prefectural Govt. (Japan), Div. of Atmosphere

OSAKA PREFECTURE PUBLIC NUISANCE CONTROL REGULATIONS INSTRUCTION DATA (AIR POLLUTION MATERIAL). *(Osaka-fu kogai boshi jorei setsumei shiryo (Taiki osen ni kakawaru mono)). Text in Japanese. 17p., 1971.*

The main points in the newly revised Osaka Prefecture air pollution regulations are presented as well as a flow chart of the system, prefectural regulations based on the national air pollution control law, deadlines for application of regulations and standards, a list of items for which registration or reporting is required, maps of localized emission and fuel standards, and measurement and reporting procedures for specified equipment. The phrase from the old regulations which referred to a harmonious development of living environment and healthy growth of industries was removed and the purpose of the regulations is now stated as a positive effort to control environmental pollution, based on the idea of priority for human welfare. In the revised regulations, the scope of the definition of pollution and the types of pollutants are enlarged. Standards have been made more strict for fuels and industrial materials. Violators of new emission and equipment standards are subject to an order for immediate improvement or a temporary suspension of operation. The governor has the prerogative of requesting stoppage of industrial water supply to the violating industry when he recognizes a need for an immediate interruption of operation. The governor has the prerogative of publishing the names of violators and construction of new pollutant emission facilities require the permission of his office. The governor is also responsible for issuing a warning to the public when human health and the living environment are endangered and for requesting traffic restrictions. Penalties for violators have been made more strict.

20919 APTIC NO. 39019

Kawasaki Municipal Government (Japan)

KAWASAKI CITY PUBLIC NUISANCE CONTROL REGULATIONS. *(Kawasaki-shi kogai boshi jorei). Text in Japanese. 24p., 1972.*

Kawasaki City public niusance control regulations include general definitions of public responsibilities, basic environmental and maximum allowable emission standards, enforcement programs, plans, regulations concerning emissions by industries, regulations concerning automobiles, pollution control agreements, functions of the municipal pollution monitoring council, and miscellaneous rules and penal systems. Those concerning air pollution state that industries must follow the basic emission standards that maximum allowable concentrations be maintained, and that the management of existing and new industries strictly adhere to the regulations.0 Those industries emitting materials that come under the category of pollutants must measure and record the quantity and concentration of emissions. The mayor is responsible for warning the public when air pollution reaches a level that may damage health and for requesting that the parties responsible for emitting pollutants bring about an immediate improvement of the situation. Pollution sources subject to these regulations are listed by categories and types of operation.

20920 APTIC NO. 39347

FIVE MONTHS FOR THE PERFORMANCE OF A PROGRAMME. *(Fuenf Monate Zeit fuer ein Programm). Text in German. Umwelt (Duesseldorf), 2(1):14-16, Jan. 1972.*

The results of the activity of the Department of Environment established by the Minister of the Interior of the German Federal Republic as a branch of his ministry to deal with environmental problems and pollution abatement are reviewed. The basic idea of the department was to invite experts within the fields of science and industry to cooperate in the outlining of an environmental program of national activity. Within five months, the department developed the concept of the program for Western Germany. Based on its initiative, drafts for the Benzene/Lead Act, the Refuse Removal Act, the Water Economy Act, and the Emission Protection Act were presented for legislation.

20921 APTIC NO. 39481

Voorhees (Alan M.) and Associates, Inc., McLean, Va. and Ryckman, Edgerley, Tomlinson and Associates, St. Louis, Mo.

AIR QUALITY CONSIDERATIONS IN TRANSPORTATION AND URBAN PLANNING A FIVE-YEAR PROGRAM GUIDE. *Office of Air Programs Contract EPA-CPA-70-100, AMV-509, RETA-594, 187p., Dec. 1971. 236 refs.*

NTIS: PB 207111

A five-year program of research and support activities to determine and demonstrate the air pollution aspects of urban and transportation planning and to encourage the inclusion of air quality control considerations in the planning process was presented. The interrelationships between air pollution, land use, and transportation systems were described. The role of urban and transportation planning in air quality control was discussed in the following contexts: land development and density patterns; spatial arrangement of buildings and site activities; planning of transportation systems; design and construction practices; and operation of buildings and transportation facilities. Information about the impact of planning actions on air quality was derived from a computer simulation study of work travel for a city of two and one-half million people. The basic work items in the 5-year work program are adaption of basic air pollution research to the planning process, case studies on the impact of transportation and land use on air quality, simulation studies on the impact of transportation and land use on air quality, demonstration projects aimed at showing air quality changes through transportation and land use planning, and legislative and administrative studies to implement urban and transportation plans and programs critical to reducing air pollution.

20922 APTIC NO. 39527

LAW OF APRIL 21, 1966 ON THE PROTECTION OF ATMOSPHERIC AIR FROM POLLUTION. *(Ustawa z dnia 21 kwietnia 1966 r. o ochronie powietrza atmosferycznego przed zanieczyszczaniem). Dziennik Ustaw (Warsaw), no. 14, 1966. 1 ref. Translated from Polish. 2p.*

The protection of atmospheric air from pollution is intended to enforce maximum allowable concentrations while gradually reducing the quantities of pollutants emitted by factories, motor vehicles, waste dumps, and other sources. The Council of Ministers will issue further ordinances on allowable concentrations, variances, and administrative arrangements. The overall aim is to protect human health, vegetation, animals, forests, water, climate, and prevent other losses to the national economy.

20923 APTIC NO. 39126

Anderson, Earl V.

POLLUTION CONTROL: A WORLD TRADE VOLUME. *Chem. Eng. News, 49(46):14-18, Nov. 1971. 1 ref.*

Environmental protection programs can keep out imports or at least raise their prices; they can force a company out of the export market or trigger a flow of capital and jobs to other countries; they can even nudge a country s balance of payments one way or the other. High-polluting industries may be tempted to relocate where regulations are not so strict. No one country would gain a competitive edge from pollution control if all countries could agree on a single set of international standards. While many international cooperative efforts are under way on pollution, most of them concentrate on the technical aspects of the problem. The greatest impact on international economics will come, not from product standards, but from legislation that regulates processes. The industries that will shoulder the heaviest financial burdens for pollution abatement include the chemical, ferrous and nonferrous metals, pulp and paper, petroleum, stone-glass-clay, and the energy industries. Employment would be affected if industrial migration were to take place. One solution is to impose an additional charge on imports, calculated to offset the difference between domestic and foreign pollution control costs. Problems with this idea are discussed, as well as other possible adjustments.

20924 APTIC NO. 39392

Baldinger, Friedrich

ENVIRONMENTAL PROTECTION - NOT A SLOGAN, BUT A DUTY. *(Umweltschutz, kein Schlagwort, sondern eine Verpflichtung). Text in German. Chimia, 26(3):107-114, March 1972. 7 refs. (Presented at the Schweizerischer Chemiker Verband, Winter Session, Bad Attisholz, Feb. 5, 1972.)*

General ecological problems and dusties in pollution control are outlined. Increase in population and consumption are the primary cause of environmental pollution. Measures controlling symptoms only are inadequate. The Swiss Environmental Protection Agency (Amt fuer Umweltschutz), established March 1971, will submit an environmental protection bill before 1973. Guidelines for quality standards for solid, liquid, and gaseous fuels, emission limits for domestic heating, industrial firings, and incinerators, as well as measures for the subsequent reduction of gasoline lead content are being prepared. The expenditures in Switzerland for environmental protection lie below the average of about 3%. Investments for such purposes will not fail to affect consumption.

20925 APTIC NO. 39187

Berg, Joachim

GOVERNMENTAL RESPONSIBILITY FOR AIR POLLUTION CONTROL. *(Die Verantwortung des Staates fuer die Bekrempfung der Luftverschmutzung). Text in German. National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 281-284. (Oct. 4-7, Paper VIII/8.)*

The responsibility of the government in clean air maintenance as part of the whole economy is discussed. Air pollution is a by-product of technological progress and should be prevented by participation of the main pollutant sources as well as by public involvement. Industry, automobile traffic, and domestic heating are the three main categories of emission sources. The large industries should be required, on a legal basis, to provide monitoring installations for the exposed areas and to respect equipment criteria allowing an optimum reduction in emissions. Automobiles should be provided with all emission reducing devices; fuel and other criteria should be respected to reduce their air polluting role. Domestic heating should have specific regulations as to fuel and stack design, and new residential areas should be planned taking into account the population density factor. Emission limits should be legally imposed wherever possible. Legal control activities carried out in countries such as Scandinavia, Belgium, England, France, Italy, the Soviet Union, and the United States are reviewed. Legislation has to be limited to the available techniques for abatement control. The need for international cooperation in the protection of clean air is emphasized.

20926 APTIC NO. 39642

Bogart, N. T.

AIR POLLUTION CONTROL IN THE SAN FRANCISCO BAY AREA. *Proc. Am. Petrol Inst., Sect. III, vol 42:386-391, 1962. (Presented at the American Petroleum Inst. Div. of Refining, Midyear Meeting, 27th, San Francisco, Calif., May 15, 1962.)*

A voluntary control effort and education program was begun by community leaders, including oil industry representatives, in 1949, six years before the Bay Area Air Pollution Control District began operation. Community leaders also urged state legislation which established the District in 1955 to control air pollution on a regional basis. After the legislation became effective, the oil industry extended its support of air pollution control. It helped the District prepare two comprehensive performance regulations by providing elaborate technical information. These regulations control open burning, smoke, particulate matter, and sulfur dioxide. The regulations enjoy acceptance becauses of their sound technical basis and because they set emission limits without specifying the type of equipment to be used to meet such limits. (Author abstract modified)

20927 APTIC NO. 39338

Boisseree, Klaus and Klaus Hansmann

A COMPROMISE. DRAFT OF A FEDERAL EMISSION PROTECTION LAW. *(Eine Mittelloesung. Zum Gesetzentwurf Eines Bundes-Immissionsschutzgesetzes). Text in German. Umwelt (Duesseldorf), 2(2):22-26, April 1972.*

The aim of the Federal Emission Protection Law is to protect human beings, animals, plants, and materials from harmful effects, disadvantages, and nuisance resulting from pollution. The legislative function of the law is effected by the Federal Government while the executive function is assigned to the states. One important part of the draft deals with the construction and operation of plants which may cause harmful environmental effects or endanger the neighborhood. These plants will require an offical authorization before starting operation to be issued only after a thorough examination of the while plant. This examination procedure is not restricted only to industrial plants but applies also to plants serving public purposes. The prerequisite for the permit is that provisions are made to prevent harmful environmental effects. The penalty for any damage or harmful effect to humans or the environment is imprisonment for up to 5 years or fines up to approximately $27,472 (100,000 DM).

20928 APTIC NO. 39380

Boisseree, Klaus

CONTEMPORARY PROBLEMS INVOLVED IN ENVIRONMENTAL PROTECTION. *(Aktuelle Fragen des Umweltschutzes). Text in German. Luftverunreinigung, 1971:1-4, Dec. 1971. 3 refs. (Presented at the Landesbeirat fuer Immissionsschutz des Landes Nordrhein- Westfahlen, April 29, 1971, Dortmund, West Germany.)*

Contemporary problems in environmental protection are reviewed, with special regard to North Rhine-Westphalia. Despite certain achievements, particularly in dust emission abatement, the situation is generally not satisfactory. An environmental protection information system and a warning and forecast system are being prepared by the Federal government and other authorities. Improvements in legislation and increased rigor in penal law are required. The quality requirements applied in pollution control should be standardized. Products and processes most responsible for pollution should be banned. The necessity of the establishment of a central department of environmental protection should be considered. Except for certain techniques, pollution control measures are not rentable, and thus affect prices. Since pollution control is a major concern at an international scale, the risks of distorted competition due to related investments are reduced. The aspects of pollution are increasingly considered in regional and city planning.

20929 APTIC NO. 39238

Carlin, Alan P. and George E. Kocher

ENVIRONMENTAL PROBLEMS: THEIR CAUSES, CURES, AND EVOLUTION USING SOUTHERN CALIFORNIA SMOG AS AN EXAMPLE. *Rand Corp., Santa Monica, Calif., R-640-CC/RC, 107p., May 1971. 41 refs.*

The major underlying causes of environmental problems and some of the possible remedies, both in general and in the specific case of photochemical air pollution in southern California, are identified. Environmental problems arise because of increase in the demands placed on the environment and/or because of less than optimum management of such demands by society. Three of the demand-increasing causes, labeled primary, are relatively difficult to change: population growth, growth in per capita income, and use of new technology incompatible with ecologic processes. One management-inhibiting cause, imperfections in the economic system, is also identified. The problem in the Los Angeles area began in the late 1930s or early 1940s. Public and official recognition occurred in the late summer of 1943. After a number of pseudo-solutions failed to bring about the desired result, public support and government approval was achieved for an effective political solution with the passage of the California Pure Air Act of 1968, which provided the basis for the first effective attempt to control motor vehicle emissions in California. Implementation of an effective solution will probably not be complete before 1975 in southern California and quite possible much later, while the photochemical air pollution problem is unlikely to be finally resolved before the mid-1980s at the earliest. One of the major reasons for the long delays has been the lack of adequate research and planning effort. Data on sources of photochemical air pollution, their control, and estimated future emission levels are included.

20930 APTIC NO. 39036

Chanlett, Emil T.

PLAN FOR ASSIMILATION OF WASTES. *J. Environ. Health, 34(2):198- 200, Sept.-Oct. 1971.*

The public expectations of environmental control go beyond demonstrable human health effects and include levels of annoyance and nuisance, levels of esthetics, concern for wildlife, flora and fauna, ecological balance, assurance against emotional scares of doomsday and extinction, and treatment of chemophobia. There then remains the necessity to make tough descisions on the prudent use of assimilative capacity of water, air, and land for wastes. Population growth, production, and consumption and altering the environment at an exponential rate. The natural constraints of any particular geographical area must be recognized. Environmental control agencies of local government must participate in planning by those committing public and private capital so that the effects of that commitment on the quality on the environment are factored into the decisions on design, costs and benefits, execution of the work, and on choices for future maintenance and use. Participation in this planning requires highly qualified experts. The structure of government, assignment of responsibilities, and coordination of effort at federal, state, regional, and local levels must permit and facilitate and effective attack for the preservation of the environment. Finally, people in every thread of the social and community fabric must care.

20931 APTIC NO. 39749

Damon, W. A.

THE ALKALI ACT AND THE WORK OF THE ALKALI INSPECTORS. *Roy. Soc. Health J. (London), 76(9):566-575, 1956. 16 refs. (Presented at the Conference of Sanitary Inspectors, Health Congress, Blackpool, England, April 26, 1956.)*

About the middle of the last century, great indignation was caused by the discharge of hydrogen chloride from the new process for manufacture of alkali or sodium carbonate. So great was the outcry and so frequent were the actions for damages that a Royal Commission was appointed, and following its report the first alkali Act of 1863 was passed. It stipulated that not less than 95% of the HCl produced in the process of making alkali should be condensed or absorbed. The residual 5% might be discharged into the air provided it was diluted to contain not more than 1/5 grain of HCl per cu ft. The Act also provided for the setting up of a central staff of inspectors under the control of the Local Government Board. The original Act was extended by subsequent legislation at intervals until 1906 when the current Alkali Act Works Regulation Act was passed. General provisions, statutory limits, and the Alkali Inspectorate are described. Chemical and physical methods for treating waste gases and chimney dispersal are mentioned. The owners of process schedules under the Alkali Act are required to adopt the best practicable means whereby this discharge of noxious or offensive gases may be reduced and the residue discharged harmlessly and inoffensively. Sulfuric acid processes, viscose processes, cement manufacture, and petroleum refining are mentioned. Non-scheduled processes include electricity generating stations, coal carbonization works, ironworks, steelworks, ceramic works, and fluorine emissions. The clean Air Bill is cited.

20932 APTIC NO. 39241

Degler, Stanley E.

STATE AIR POLLUTION CONTROL LAWS. *Revised ed., Washington, D. C., Bureau of National Affairs, 1970, 93p.*

The status of the law on air pollution control in each state of the United States, the District of Columbia, Puerto Rico, and in the cities of Chicago, Detroit, New York, Philadelphia, and Pittsburgh is summarized. The administering agency and a brief listing of the subject matter of regulations are included for each state, together with a citation of the state air pollution control law. State regulations generally apply to particulates and sulfur oxides; open burning is almost always covered. Some states have regulations for carbon monoxide, photochemical oxidants, hydrocarbons, and toxic substances, e.g., fluorides and beryllium. The entire text of the California statute is reproduced with details on the general provisions, administration, and powers of the Air Resources Board; motor vehicle emission control; and regional air pollution control. A model state air pollution control act developed by the Council of State Governments is examined.

20933 APTIC NO. 38829

Gillette, Robert

NATIONAL ENVIRONMENTAL POLICY ACT: SIGNS OF BACKLASH ARE EVIDENT. *Science, 176(4030):30-33, April 7, 1972.*

The signs of backlash against the 2-year-old National Environmental Policy Act (NEPA) are becoming evident. NEPA has two fundamental and apparently irritating purposes: to open to the public view a major new source of information about the way in which the government s activities affect the environment, and in so doing, to goad the whole federal establishment into adopting a more sympathetic attitude toward a fragile biosphere. Some of the discontent toward NEPA springs from the uncomfortable burden of paperwork and soul-searching it has imposed on federal bureaucrats. The most immediate source of anxiety, however, is the enthusiasm and rigor with which federal courts have been interpreting NEPA. Less well known, though no less infuriating to the executive branch was a court decision in January that forced the Interior Department to postpone its plans to sell oil and gas leases on tracts of Gulf Coast waters covering an area half the size of Rhode Island. Altogether, district and appeals courts have handed down more than 160 decisions under NEPA, with new rulings being tallied at the rate of about one a week.

20934 APTIC NO. 39337

Graeub, William Campbell, Albert A. Grant and Robley Winfrey

IMPACT OF ENVIRONMENTAL CONTROLS ON HIGHWAYS. *Proc. Am. Soc. Civil Engrs., 98(TE2):263-274, May 1972. 7 refs.*

Current Federal environmental legislation requires consideration of social, economic, and environmental effects in the location and construction of highways. Factors in these objectives e.g., esthetics are nonquantifiable and nonpriceable. The impacts of legislation on the decision-making process, organization, and management are extensive. Now is the time to study highway department organizations as they relate to new environmental requirements, restructure the organizations, and to assure the public that highway agencies can respond to changing times. The environmental regulations and their effects on the entire spectrum of highway administrations are summarized.

20935 APTIC NO. 39353

Greco, Michael S.

THE CLEAN AIR AMENDMENTS OF 1970: BETTER AUTOMOTIVE IDEAS FROM CONGRESS. *Environ. Affairs, 1(2):384-468, June 1971. 383 refs.*

The various important provisions of the 1970 Clean Air Amendments and their effectiveness in controlling air pollution are considered. Previous Federal air pollution legislation, the Air Quality Act of 1967, and the failings of the 1967 Act are reviewed. The underlying philosophy of the 1970 Act, provisions affecting stationary sources of pollution, and those provisions governing motor vehicle pollution are considered. Research programs and funding, implementation plans and enforcement, air quality control regions, criteria and standards, and provisions for appeal are included with regard to stationary sources. Standards, regulation of fuels, alternatives to the internal combustion engine, enforcement of standards, injunctions, penalties, citizen suits, and provisions for appeal are considered with regard to motor vehicles. The economic and legal issues raised concerning automobile pollution emission standards are discussed.

20936 APTIC NO. 39767

Haagen-Smit, A. J.

DETERMINATION OF THE REQUIRED EXTENT OF CONTROLLING AIR POLLUTION. *(Bepaling van de gewenste mate van beheersing van luchtverontreiniging). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 27(4):108-115, 1972. 8 refs.*

The principle of the determination of the required extent of air pollution control is explained on the basis of the procedure applied in California. General problems of establishing air quality standards are outlined. Maximum standards should cover the largest possible proportion, maybe 99%, of the population. Relationships between the cost of control measures and pollutant concentrations are established. Both the multiple effects and the synergism of individual pollutants should be taken into account when establishing allowable concentration ratios. While both test equipment and procedures are expensive, test stations for continuous preventive measurement are most valuable. When mapping pollution sources, priorities should be set up, and meteorological conditions should be considered, with special regard to stagnation and smog conditions. Three different methods of determining the required emission limitations are discussed. The method of retrospective calculation, as applied in California, is described. Another method (black-box model) is based on the principle of the diffusion phenomena which is determined by both altitude of the temperature inversion and geographic limits. The individual sources of emission are handled separately according to a better method. Four different possibilities of pollution control are discussed. Total suppression of emissions may be necessary in certain cases, while a uniform abatement of emissions is applied for automobile exhaust, for example. Selective emission source control measures are usually seasonal, and dependent on geographic as well as meteorographic conditions. The prevention of new emission sources usually requires the introduction of new techniques and technologies.

20937 APTIC NO. 38879

Harada, Naohiko and Yoshihiro Nomura

AN OUTLINE AND ISSUES OF PUBLIC NUISANCE LAWS, (1), AIR POLLUTION CONTROL (PREVENTION). *(Kogaiho no taikei to ronten, (1), taiki osen no boshi). Text in Japanese. Toshi Kaihatsu (Urban 0Development), no.12:94-97, Dec. 1971.*

The necessity for air pollution control and the content of control legislation are discussed. Definitions of target facilities; the significance, types and effects of emission standards; compulsory registration, checking, reporting, and investigation procedures; and local governments control and fuel regulations are explained. Emission standards for stack gas emission sources are determined separately by the ordinances of the Office of the Prime Minister in three categories: sulfur oxides, soot, and toxic substances. At present, standards are rather lenient because of the broadness of the area to which they are uniformally applied, although special, more strict limits are to be applied to sources located in congested industrial areas. Wherever an individual prefectural government recognizes the need for more strict emission standards than those designated by the national government, it is permitted to tighten the standards to the local environment. This is called a topping standard. In addition, a prefectural government has autonomous legislative power to designate sources other than those included in the Air Pollution Control Law as subject facilities and can designate types of stack gas other than those listed in the law as pollutants.

20938 APTIC NO. 39312

Hogger, D.

LEGAL BASIS AND APPLICATION OF THE LAW IN THE FIGHT AGAINST AIR POLLUTION. *(Rechtsgrundlagen und Rechtsanwendung bei der Bekaempfung der Luftverunreinigungen). Text in German. Eidgenoessische Kommission fuer Lufthygiene, Zurich (Switzerland). Probleme der Luftverunreinigung durch die Industrie, p. 67-71, 1968. (Sept. 9-10.) (Presented at the Schweizerisches Treffen fuer Chemie, 2nd, Basel, Switzerland.)*

The Swiss work law of 1964 rules that the employer is obligated to take all necessary measures for the protection of his employees life and health, and for the protection of the environment from damaging or noxious effects. This law is applicable on a nationwide basis and supersedes any previous regulations. It protects also health and life of the population in the surrounding areas, as well as animals, plants, and buildings. In actual practice, while contamination can be reduced, maintaining a condition of completely pure air is impossible. However, it is considered sufficient to ensure that concentrations of pollutants in the air do not exceed a certain safe level. Where, for technological reasons, an industrial plant cannot be operated without producing some emissions, a certain tolerance may have to be applied. The authorities are particularly concerned with conditions where the health of the population and/or the growth of plants, particularly forests, is seriously endangered. In such cases, drastic steps may be taken, such as closing down manufacturing plants. The choice of methods for attaining conditions to comply with the law is left to the company which can choose to use fuel, raw materials, and manufacturing methods in such a way that few emissions are generated; it may install equipment for purification of the waste gases; or it may provide a high chimney to obtain better dispersion of waste gases. As an example of values published as maximum permissible concentrations of pollutants, the permissible daily average for sulfur dioxide is 0.3 cu cm/cu m of air in winter, and 0.2 cu cm in summer.

20939 APTIC NO. 38769

Kramon, James M.

INVERSE CONDEMNATION AND AIR POLLUTION. *Natur. Resources J., 11(1):148-161, Jan. 1971. 70 refs.*

When the cause of air pollution can be isolated and proximately related to a particular etiologic or economic harm, a remedy to tort on a theory of nuisance or ultrahazardous liability is recognized. Similarly, when negligence can be shown, a recovery on that theory is a possibility. Such solutions are, however, of little benefit to the owner of property in an area where ambient air is too polluted for persons to endure. In such a situation, property is rendered worthless for any purpose and damages do not sufficiently compensate the owner. A meaningful possibility in this case is the inverse condemnation suit, a suit by a private party to force the state to exercise the power of eminent domain or, if the state is a major polluter, a suit against the state itself. Ways in which the courts and legislatures could make the law of inverse condemnation an effective tool for dealing with air pollution problems are discussed and illustrated by hypothetical examples. A prime requirement is that the courts recognize the analogy between air pollution and the more traditional invasions of property.

20940 APTIC NO. 38971

Laroche, P.

PROGRESS MADE IN RECENT YEARS IN THE PREVENTION OF ATMOSPHERIC POLLUTION. *(Progres realises ces dernieres annees dans la prevention de la pollution atmospherique). Text in French. Ind. Miner., 54(2):63-70, Feb. 1972.*

In 1960, committee composed of specialists from various industries and experts in the fields of heating and energy sources was formed to combating air pollution in France. Later named CITEPA (Centre Interprofessionel Technique d Etude de la Pollution Atmospherique), this committee coordinates the work being done by various laboratories and individual researchers and furnishes technical information to the government for deciding on anti-pollution measures. Since it is impractical, at least in the near future, to completely eliminate noxious emissions, special attention is given to dispersion of pollutants by the use of high chimneys and to the study and measurement of industrial and residential pollution. The most prominent pollutants are dust, sulfur dioxide, and carbon monoxide. The present standard method used in France for measuring ambient dust and SO2 levels is by SF (sulfur-fume) apparatus, comprising a combination of filter and water bottle. The air being sampled is sucked through a paper filter, and the darkening of the filter is measured photometrically and interpreted in terms of particle sizes below 10 micron. In parallel, the concentration of heavier dust particles is measured by collecting atmospheric sedimentation on thin plates coated with vaseline. The air, having passed through the filter of the SF apparatus, is absorbed in a water bottle to retain the SO2 for subsequent measuring in acidic form. For measuring CO emission, apparatus based on absorption of infrared radiation is employed. Minimum chimney heights are now being determined by a formula which takes into account the maximum permissible SO2 content at ground level. Chimneys as high as 240 m are not unusual.

20941 APTIC NO. 39253

Leopold, Luna B., Frank E. Clarke, Bruce B. Hanshaw, and James R. Balsley

A PROCEDURE FOR EVALUATING ENVIRONMENTAL IMPACT. *Geol. Surv. Circ. GPO:9-20-420, no. 645, 13p., 1971. 3 refs.*

A matrix which is general enough to be used as a reference checklist or a reminder of the full range of actions and impacts on the environment that may relate to proposed actions is presented. In providing a system for the analysis and numerical weighting of probable impacts, it does not produce and overall quantitative rating but rather portrays many value judgments. The generalized procedure for an action program involves statement of the objective, technologic possibilities for achieving the objective, proposed actions and alternatives, environmental characterization report prior to initiation of action, alternative engineering plans identification of impact and analysis of magnitude and importance of impact, assessment of impact, and recommendations. The proposed manner of using the matrix is aimed at separating as far as possible factual information on magnitude of each type impact from the more subjective evaluation of the importance of the impact, the latter involving preference or bias to some degree. Impact assessment of a phosphate mining lease by matrix analysis is presented as an example.

20942 APTIC NO. 39306

Mahler, E. A. J.

THE FIGHT AGAINST AIR POLLUTION IN THE VICINITY OF INDUSTRIAL WORKS IN GREAT BRITAIN. *(Die Bekaempfung der Luftverunreinigung in der Umgebung industrieller Betriebe in Grossbritannien). Text in German. Eidgenoessische Kommission fuer Lufthygiene, Zurich (Switzerland), Probleme der Luftverunreinigung durch die Industrie, p. 15-22, 1968. (Sept. 9-10) (Presented at the Schweizerisches Treffen fuer Chemie, 2nd, Basel, Switzerland.)*

British regulations for combatting emissions from emissions from industrial plants include the Public Health Act of 1936, the Clean Air Act of 1956, the Alkali Works Regulation Act of 1906, and the Alkali Works Order of 1966. The Clean Air Act contains regulations about minimum height of chimneys and limitations in soot emissions. The Alkali Acts specify recommended means for determining standards of maximum permissible concentrations of air pollutants. The manufacture of Fletton bricks from clay containing 10% carbon and 500 to 700 ppm fluorine which generates emissions of sulfur dioxide, fluorine compounds, and an offensive smell. Various methods for removal of SO2 and F, such as the Monsanto method, have been tried but have proved impractical in view of the very large volume of waste gases to be handled. For the time being, dispersion of waste gases by means of high chimneys has been the only effective practical remedy. In thermal power stations, removal of sulfur dioxide by forcing the waste gases through ammonia scrubber installations has been very satisfactory, provided that inexpensive ammonia is available and a market for ammonium sulfate assured. Other power plants use water with additions of chalk or calcium carbonate as scrubbing liquids. The drawback of this method is the cooling of the waste gases which then lose their buoyancy and descend to the ground, causing formation of haze and offensive smells. Dispersion of waste gases by 600 to 800 foot chimneys is so far considered the most practical remedy.

20943 APTIC NO. 38762

Mahoney, James R.

EMITTER, CONTROLLER COMPETENCY NEEDED TO EMPLOY KNOWN AIR POLLUTION CONTROLS. *J. Environ. Health, 34(4):394-396, Jan./Feb. 1972.*

If the knowledge currently available could be translated into routine practice in air pollution control, most of the existing problems could be managed within a relatively short time. This suggests the need for effective communication. Regulatory agencies need to acquire the skills for development and evaluation of emission reduction strategies, while the suppliers of improved equipment must know the requirements and the desires of the regulatory agencies so they may develop the appropriate devices. The emitters must know the requirements and regulations of the appropriate agencies, the types of equipment available, and how to obtain the technical talent necessary to man the emission control systems. Types of pollutants, surveillance, and control systems are considered in the planning and evaluation of air pollution abatement.

20944 APTIC NO. 39717

McConnell, E. B.

SOHIO S RELATIONS WITH POLLUTION OFFICIALS. *Am. Petrol. Inst. Proc., 36(3):299-300, 1956.*

The Standard Oil Company (Ohio) maintains good relations with air and water-pollution- control officials by recognizing pollution problems early, developing methods to correct them, attacking them in a sound technical manner, and keeping officials and the public informed through meetings, talks, and printed articles. This enables officials, to present the problems of industries factually to the public and ward off unfavorable publicity. Some examples of company control methods and public relation techniques are discussed. (Author abstract modified)

20945 APTIC NO. 39153

Meyer, Michael B.

AIR AND NOISE POLLUTION SURROUNDING AIRPORTS: EAST HAVEN V. EASTERN AIRLINES, INC. *Environ. Affairs, 1(4):862-881, March 1972. 64 refs.*

In the recent court case of East Haven versus Eastern Airlines, Inc., the court ruled against the plaintiffs and for a public right to relatively unrestricted air travel. The ruling is representative of the majority court view in the United States today. At present, nuisance and trespass are not applicable to air pollution from airports. If the problem of air pollution from modern airport operations is to be resolved without legislation, courts will have to adopt a more vigorous and imaginative application of established common law theories. Courts may consider the air pollution from running a modern airport either a nuisance or a trespass. In either case, injunctive relief is justified. There is no lack of legal theories under the common law for relief of air pollution from airports; there is only a lack of judicial willingness to apply the theories. (Author conclusions modified)

20946 APTIC NO. 39386

Miller, Stanton and Carol Lewicke

AIR POLLUTION OVER THE STATES. *Environ. Sci. Technol., 6(2):111- 117, Feb. 1972.*

The goal of clean air by 1975 – envisioned in the latest federal Clean Air Act – is a reasonable possibility, according to many state air pollution officials. There are 247 air quality control regions and approximately 4000 personnel on board today in federal, state, and local programs. It is estimated that $23.7 billion will be spent in the five-year period of 1970-75. An implementation plan constitutes a control strategy – a combination of actions which when taken in the aggregate will achieve in a given region the degree of clean air specified in the national ambient air quality standards. The combination includes emission limitations, traffic controls, emission changes or charges, process alterations, and revised management practices. In January, state officials submitted their plans for bringing emissions within their states to the level specified in the national standards. Before any plan is federally approved, there are some 15-20 discrete elements that are examined, including: legal authority for the state to take action; adequacy of emission inventory; control strategy; adequacy of monitoring network; and adequacy of episode control. Differences in plans between each state, modeling procedures, enforcement, monitoring netwoek, standards, regions, and industries are considered.

20947 APTIC NO. 39467

Moorman, James Watt

OUTLINE OF FEDERAL ENVIRONMENTAL LAW FOR THE PRACTICING LAWYER. *In: Law and the Environment. Malcolm F. Baldwin and James K. Page, Jr. (eds.), New York, Walker and Co., 1970, p. 182-234. 283 refs.*

In summarizing Federal environmental law, procedural matters including jurisdiction and related subjects, the Freedom of Information Act and the use of Executive Privilege, and questions of burden of proof and evidence are reviewed. The Air Quality Act of 1967, Federal installations, emergency powers, and vehicle exhaust emission standards are discussed. Aspects of public domain, including the recreation concept, national forests, national parks, the Bureau of Land Management, wildlife refuges, wilderness, Alaska, and the Outer Continental Shelf are also considered, and legal aspects of water pollution, noise pollution, and land and water use are considered.

20948 APTIC NO. 38833

Norstrom, R. J., C. Quadling, J. R. Marier, and P. Wolters

POLLUTION AND RAPID ACCESS TO THE LITERATURE. *Can. Res. Develop., 5(2):20-22, March-April 1972. 5 refs.*

Early in 1970, the National Research Council of Canada was authorized to establish a Pollution Information Storage and Retrieval Center in the National Science Library. The task of gathering relevent references together and assembling the database was informally designated the Pollution Information Project (PIP). The NSL staff and NRC biology division scientists cooperated to set up procedures which allowed the already existing CAN/SDI (Canadian Selective Dissemination of Information) system to be used to assemble the component references of the PIP data-base on magnetic tape. The problem of defining the extent of interest in pollution to the retrieval system was approached by reading a large number of titles of pollution-relevant scientific papers and making a checklist containing the relevant single words or combinations of words which would have been needed to retrieve the title. A combination approach was employed in which paired word blocks were utilized in such a way as to allow sequential automatic pairing of names of individual sources and pollutants. Input to the new data-base and retrieval procedures are indicated.

20949 APTIC NO. 39186

Oels, H.

CLEAN AIR TECHNICAL REGULATIONS IN THE FEDERAL REPUBLIC OF GERMANY: TECHNICAL GUIDANCE. *(Die technischen Vorschriften zur Luftreinhaltung in der Bundesrepublik Deutschland: Technische Anleitung zur Reinhaltung der Luft). Text in German. National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 277-278. (Oct. 4-7, Paper VIII/6.)*

The technical guidance of the clean air regulations issued in federal Germany is discussed. It includes two basic constituent parts, one dealing with general regulations and the other dedicated to minimum requirements from specific plants. The general regulations are based on the necessity of prophylactic measures to be taken for clean air maintenance and includes the maximum allowable limits of air pollutants. Dust fall should not exceed a monthly average value of 0.65 g/cu m/day when determined with the Bergerhoff device. Long term values of sulfur dioxide should not exceed 0.4 mg SO_2/cu m air and short term concentrations should not exceed 0.75 mg SO_2/cu m air; the short term is considered as below half an hour within a two hour time span. Guide-lines as to how to determine the basic pollutant load of a given area and how to determine the optimum stack dimensions for certain conditions are given. The authorities are supposed to require the installation of dust and SO2 monitoring systems from industrial plants of certain dimensions. The specific minimum requirements included in the second part of the document deal with fuel criteria for boilers of above 10 t steam/hr performance, with installations for refuse burning, for the extraction of raw iron and non-iron metals, with steel manufacturing plants, and with cement milling plants. These requirements are based on the last achievements of technical knowledge and carry a flexible character to be adaptable to further technological developments.

20950 APTIC NO. 39659

Parker, A.

AIR AND WATER POLLUTION IN THE IRON AND STEEL INDUSTRY. *J. Iron Steel Inst. (London), vol. 186:297-302, Aug. 1958.*

The principal legislation now in force in relation to air pollution with regard to the British iron and steel industry are the Alkali Works Regulation Act of 1906 and the Clean Air Act of 1956. Under the Alkali Acts, the defined processes must not be operated until the owner has obtained a certificate of registration, which must be renewed annually. Before registration is granted, the Chief Alkali Inspector must be satisfied that the best practicle means are provided to minimize the emission of noxious or offensive gases. The Clean Air Act relates only to the mitigation of air pollution by smoke, grit, and dust from equipment burning fuel. Technical problems include replacement of steam-fired locomotives with diesel-electric engines, creation of dust in delivering iron ore to the stockyards, air pollution from blast furnace gas, and evolution of red fumes from the prerefining of molten metal during steelmaking. Large quantities of gas carring dust and fumes are discharged from open hearth furnaces. The most difficult problem is that of cleaning the gas discharged from the bottom-blown converter. Water pollution is also discussed.

20951 APTIC NO. 39694

Reed, Homer, Myrl A. Reaugh, and Arthur F. Stribley, Jr.

THE PETROLEUM INDUSTRY AND SMOG. *Petrol. Process., 4(4):391-394, April 1949.*

Petroleum refiners in the Los Angeles area, even though their plants are not believed to be contributing to the eye-irritating smog there, took a principal part in the smog relief program, through their Smoke and Fumes Committee. Research departments of the individual oil companies initiated studies to determine the nature and extent of contaminants in the air. In addition the refiners took direct steps to minimize air contamination from sulfur dioxide resulting from refinery operations. The burning of sludge sulfuric acid was voluntarily discontinued. A program costing several millions to remove sulfur from cracker fuel gas before it is burned was expected to be in operation in 1949. (Author abstract modified)

20952 APTIC NO. 39284

Silex, Klaus

TECHNICAL ORGANIZATION OF DUST CONTROL IN THE FOUNDRIES OF THE GERMAN DEMOCRATIC REPUBLIC. *(Organisation der Technischen Staubbekaempfung in den Giessereien der DDR). Text in German. Giessereitechnik, 15(3):247-250, Aug. 1969. 1 ref.*

While foundries in the German Democratic Republic represent only about 1% of all industrial works, their contribution to the incidence silicosis is many times that number. To combat this problem, a state agency was organized for the foundry industry, headed by a planning commission, the Central Office for Technical Dust Control, whose seat is in the Central Institute for Foundry Technology. It cooperates with the Central Institute for Occupational Medicine in East Berlin, and through a network of technical work groups carries out the testing of shop conditions, and recommendation of improvements in dust control equipment. For practical reasons the testing activities are restricted to the larger foundries only which, comprise only 10% of all existing foundries but account for 50% of the statewide production. The activities of the agency include the field of molding materials and molding technology, since these materials as conventionally used in foundries are the source of silicosis-inducing dusts.

20953 APTIC NO. 39743

Smith, J. H.

A PRACTICAL APPROACH TO AIR CONTROL. *Preprint, American Iron and Steel Inst., New York, N. Y., 7p., 1954. (Presented at the American Iron and Steel Institute, Regional Technical Meeting, San Francisco, Calif., Nov. 5, 1954.)*

The experiences of the Kaiser Steel Corporation in air pollution control over the past 12 years may assist other organizations in making a practical approach to their air control problem. Twelve years ago there was no air pollution legislation in the state of California. When Henry J. Kaiser was discussing the plans of the proposed steel mill, he issued instructions to engineer into the plant all proven air pollution control devices. As a result of these instructions, several air pollution scientists were retained to survey the area and to make recommendations to prevent the steel mill from ever becoming a nuisance to its neighbors. The blast furnace was equipped with a system consisting of a dust catcher, a gas washer, and a Cottrell precipitator. Coke ovens were equipped with self-sealing doors and a rigid practice was established to insure their working to their greatest efficiency. Open hearth stacks were built higher than was customary. Baghouses and dust catchers were designed into the raw materials system, and the sinter plant stack was designed to be 300 ft tall. Four Thomas continuous autometers were purchased and installed at varying distances from the mill to record sulfur concentrations. Greased slides were set out at several locations to record dustfall, and on several occasions plant pathologists and citrus experts were called in to make surveys of the vegetation in the area. At the end of World War II, with the hue and cry over smog, a Fume Investigation group was created in the Metallurgical Department. Early in 1952 it expanded to create the present Air Control and Research Department. Administration of the department and its research efforts are described.

20954 APTIC NO. 39765

Spaander, J.

AIR POLLUTION ABATEMENT IN THE NETHERLANDS. *(De bestrijding van de luchtverontreiniging in Nederland). Text in Dutch. Arch. Belg. Med. Soc., 29(3):181-194, March 1971. (Presented at the Belgische Vereniging voor Hygiene en Sociale Geneeskunde Meeting, Brussels, Belgium, Jan. 16, 1971.)*

The concept of an automatic air pollution monitoring network, now under construction in the Netherlands, is outlined. Industrial growth, increased population, and increased traffic density are the major cause of air pollution in the Netherlands. The situation is not as bad as in other highly industrialized countries, because of modern equipment, predominant west winds, and the favorable geographic conditions. Active cooperation on an international basis, particularly with other Benelux states and West Germany in research, development, and pollution monitoring, is of vital importance. Based upon the Air Pollution Control Law, an air pollution monitoring system covering the whole country is being set up. Possibilities for connecting the system to a similar network in West Germany are mentioned. Sulfur dioxide measurements are carried out automatically, and nitric oxide, nitrogen dioxide, and ozone measurements will be covered by the network at a later date. The maximum distance between two neighboring test stations will be 20 km, and a permanent meteorological forecasting service will also be integrated in the system. Intensified monitoring will be provided for certain key areas with meteorological conditions favorable for the formation of serious air pollution episodes. Costs are cited.

20955 APTIC NO. 39373

Steigerwald, B. J. and Norman L. Dunfee

THE CE S ROLE IN AIR POLLUTION CONTROL. *Consulting Eng., 1972:95-98, March 1972. 1 ref.*

The field of air pollution control presents a problem and a challenge to the professional consulting engineer firm. It may be difficult at this time to make air pollution control a significant financially successful part of the company, since research and development are dominated by private research institutes and much of the technical services area involves new0 disciplines, e.g., meteorology, atmospheric chemistry, and air sampling. The capabilities needed to offer reasonably comprehensive technical services to clients or to compete for government contracts, the available training programs, the role of the Environmental Protection Agency, and the government market for technical services are considered.

20956 APTIC NO. 39332

Strunz, Wolfgang

ENVIRONMENTAL PROTECTION BY THE NETWORK PLAN. *(Umweltschutz im Netzplan). Text in German. Allgem. Prakt. Chemie (Vienna), 23(1/2):11-12, 1972. (Paper presented at the Chemical Societies Meeting, 3rd, in Frankfurt/Main, West Germany, Nov. 29, 1971.)*

The network plan for environmental protection is explained on the example of the central city of Vienna. A simplified illustration without quantities (micron/cu m, mg/l, cu m/hr) and without positive or negative ecological evaluation is given. First the basic composition of water, and environment is entered into the network plan. The term environment is entered to signify multiple pollution effects such as caused by the automobile through its noise, exhaust gases, and lead discharge. Pollution event one adds the waste gases from industry to the conditions prevailing in the center of Vienna. Other events add further pollution. Through filters, the pollution of the air may be reduced, but nevertheless something is added. In the case of wet filters, the waste water pollution is increased. Depending on the meteorological situation, all events will lead to a certain air composition. This air will move to another point and have a decisive influence on the basic composition of the air at this point. The evaluation of the pollution situation in an area is then carried out by means of a fixed program with the aid of a computer.

20957 APTIC NO. 39640

Thum, Ernest E.

SMOKE LITIGATION IN SALT LAKE CITY. *Chem. Met. Eng., 22(25):1145-1150, June 23, 1920.*

Another stage in the smoke litigation involving smelters operating in the Salt Lake Valley, Utah, ended on Feb. 21, 1920, when a Federal judge signed an interlocutory decree permitting, under certain conditions, the continued operation of the American Smelting and Refining Co. plant at Murray and the United States Smelting Co. plant at Midvale. After the original suit of 409 farmers in 1906, the Murray plant immediately erected a large baghouse for eliminating solid particles from the gas. This was in line with the contention that the damage was largely due to compounds of sulfur and arsenic which condensed on particles of soot or other solid matter and settled with them to the ground. The company also made the proper financial settlements with the complaining farmers and agreed to construct an extensive dust chamber at the roaster department to cool the gases from those operations. The United States Smelting Co. claimed that its newly perfected Sprague process of introducing zinc oxide into the smoke would remove all cause for crop injury. At the same time the zinc would neutralize sulfuric acid, forming with it a solid which would be caught by the bags. The court also stipulated that the Midvale plant must remove all solids from its roaster and blast-furnace gases, discharging all smoke through a single smokestack free of lead, copper, arsenic, and antimony compounds and all traces of sulfur trioxide. The fate of the other plants in the region is indicated. Both American Smelting and Refining Co. and United States Smelting Co. have maintained investigating staffs during the litigation period to study the question of smoke injury in general and to operate experimental farms near the smelters. Factors modifying smoke damage, sulfur dioxide injury, and economic loss are discussed.

20958 APTIC NO. 38906

Ticer, Wilmer R.

LEGAL METHODS OF ELIMINATING CERTAIN UNDERSIRABLE BY-PRODUCTS OF THE AIR TRANSPORTATION INDUSTRY. *Natur. Resources J., 11(1):177-189, Jan. 1971. 33 refs.*

In the absence of action by the air transportation industry there are two alternatives available to eliminate its undesirable by-products: a resort to private legal action against both airport and aircraft operators, and affirmative actions on behalf of the general public by local government authorities. These public actions could include enactment of zoning regulations or excise taxes levied on runway users to discourage air traffic congestion. If the by-product cannot be eliminated or its effect on individual members of the community cannot be ascertained with sufficient precision to warrant either the assertion or the payment of a claim for damages, there should be a method of ascertaining the cost to society, in money terms, of allowing the by-product to continue; then the burden of paying that cost should be imposed on the industry. The air transportation industry in Albuquerque, N. Mex., is considered, with particular reference to legal methods of eliminating air pollution and noise. Land use, air traffic control, and ground traffic control are discussed.

20959 APTIC NO. 39079

Vaughn, Robert G.

STATE AIR POLLUTION CONTROL BOARDS: THE INTEREST GROUP MODEL AND THE LAWYER S ROLE. *Okla. Law Rev., 24(25):25-52, 1971. 165 refs.*

The effectiveness of legal institutions organized around the concept of interest is examined by analyzing the development, composition, and functioning of a particular set of legal institutions created to respond to the air pollution problem, namely, state air pollution control boards. The reasons for and implications of the decision made in the Air Quality Control Act of 1967 to leave the primary responsibility for developing and enforcing emission standards to the states, rather than to a Federal agency, are discussed in depth. The nature, composition, and powers of the state agencies are considered; the departmental and individual members clearly indicate the interests they represent, usually political sub-divisions, agriculture, labor, industry, conservation, and the general public. Analysis of the contradictions inherent in these conflicting representations indicates that the boards cannot effectively solve the air pollution problems facing the states. The concept of interest is thus found wanting both as a workable foundation for legal institutions and as an analytical and predictive tool. Consideration of its effects on the interest group process and the role of the individual in motivating social change includes discussion of the public s current concern with and perception of the environmental pollution problem.

20960 APTIC NO. 39776

White, Laurence J.

STATE LAWS AND ENFORCEMENT. *Chem. Eng. Deskbook, 79(10):13-14, 16, 18, 20, 22, May 8, 1972.*

Recent legislation, regulations, and enforcement plans are reviewed for California, Connecticut, Illinois, Massachusetts, Missouri, New Jersey, New York, Ohio, Pennsylvania, and Texas. The new measures would be concerned with the development of new air quality standards, fuel criteria, and enforcement procedures; regulation of pesticide use or sale; registration of pollutant sources; enforced monitoring of emissions; maximum allowable emission standards; waste treatment; water pollution controls; automotive emissions limits; permit systems; plant operating criteria; plans for possible air pollution episodes; and air resource management. Industry backlash, legal and political obstructions, and general problems with implementation are discussed.

20961 APTIC NO. 39000

Zimmerman, Joseph F.

THE ROLE OF THE STATE LEGISLATURE IN AIR POLLUTION ABATEMENT. *Suffolk Univ. Law Rev., 5(3):850-877, 1971. 92 refs. (Presented at the New England Legislative Conference on Air Pollution, Waterville, Maine, Dec. 14, 1970.)*

The extent of the air pollution problem, the obstacles presently hindering the implementation of an effective abatement program, the federal role in air pollution abatement, and the role of state legislatures in New England in this field are examined. Interstate and federal compacts, state and local tax incentives, a permit or prohibitory control system, state control agencies, funding and staffing, and the roles of cities and towns within the context of air pollution abatement are considered. The seriousness of the problem is generally recognized, but the necessary corrective action is hindered by economic and political obstacles, including cost of pollution control, interstate competition for industry, the competition between energy sources, and governmental costs. Although the federal government has not pre-empted air pollution abatement except for automotive emissions, the Air Quality Act of 1967 and the Clean Air Amendments of 1970 are strong moves in this direction and represent what may well be the last chance for state and local governments to adopt ambient air quality standards and a mechanism for their effective implementation.

SOCIAL ASPECTS

20962 APTIC NO. 39700

BETWEEN BULL AND BEAR. *Chem. Week, 71(14):19-20, Oct. 4, 1952.*

Firms that own chemical and petrochemical plants along the Houston Ship Channel are being squeezed from two sides. On the one hand, residents of the area have been applying pressure to try and force the companies to end pollution fast, at any cost; on the other hand, the companies have run into the inexorable pressure of economic and scientific limitations. In June, a breakdown at Mathieson s sulfuric acid and fertilizer plant near Pasadena released a great volume of dense, white, eye-smarting fumes that were carried by the night breeze to communities six and seven miles away. Next, 3,000 irate citizens of the Green s Bayou vicinity signed a petition to the Governor asking the state to clamp down on air polluters. The attitude of company officials during two public meetings is that God himself put the smell in the various chemicals and that industrial air pollution can never be entirely eliminated if we are to have industry.

20963 APTIC NO. 39625

Dodd, A. E. and L. E. Reed

THE RELATIONSHIP BETWEEN SUBJECTIVE ASSESSMENT AND OBJECTIVE MEASUREMENT OF EXHAUST SMOKE FROM DIESEL ENGINED ROAD VEHICLES. *Motor Industry Research Association, Nuneaton (England) and Warren Spring Lab., Stevenage (England), MIRA Rept. 1964/12, 19p., April 1964. 3 refs.*

A panel of 48 observed a range of exhaust smokes from various vehicles; results were compared with measurements of smoke density and volume of exhaust gases emitted, in order to define the objective conditions of an exhaust emission that will be acceptable to the general public. Four vehicles with four-stroke engines having capacities from 99 to 470 cu in. (1.6 to 7.7), and one vehicle with a 282-cubic inch (4.6 l) two-stroke engine were driven under varied conditions of exhaust smoke past the panel, who judged whether the exhausts were or were not acceptable. Optical measurements of smoke density were also made and the total volume flow of exhaust was estimated. The levels at which the majority of the panel object depend on both density and volume. Thus, smoke density expressed as weight/unit volume from a small (120 cu in., 2 l) engine can be twice that from a large (450 cu in., 7.4 l) engine before reaching the same level of unacceptability. In terms of light obscuration measurement, typical smoke densities at which the exhaust becomes unacceptable to 75% of the observers are 78 Hartridge units for a 133 cu in. (2.2 l) engine at 2200 rpm., and 54 Hartridge units for a 470 cu in. (7.7 l) engine at 1300 rpm. People will also object to smoke of a lower density in exhausts from light colored than from dark colored vehicles. (Author summary modified)

20964 APTIC NO. 39772

Downing, Paul B.

SOLVING THE AIR POLLUTION PROBLEM: A SOCIAL SCIENTIST S PERSPECTIVE. *Natur. Resources J., 11(4):693-713, Oct. 1971. 15 refs.*

The role of social science in formulating methods of air pollution is detailed. Research in the field of social science can help to determine the needs for improvement in implementing the policies of decision-matters and can study the nature of public acceptance of those policies. Proposed air quality standards must take into consideration not only technical factors, but must also consider the broad social costs and gains involved in the implementation of those standards. The economist can also play a part in making clear the cost-effectiveness of alternative control devices.

20965 APTIC NO. 39174

Hare, Charles T. and Karl J. Springer

PUBLIC RESPONSE TO DIESEL ENGINE EXHAUST ODORS. (FINAL REPORT). *Southwest Research Inst., San Antonio, Tex., Dept. of Automotive Research, Air Pollution Control Office Contract CPA 70-44, Proj. 11-2794, Rept. AR-804, 88p., April 1971. 8 refs.*

NTIS: PB 204012

A public opinion odor testing survey was conducted to determine public reaction to diesel exhaust odors. Modifications to the survey plan, questionnaire, and mobile odor evaluation laboratory are reviewed. Five definable levels of diesel exhaust odors were presented singly to different groups of people and the answers were correlated with personal data on education, income, age, and sex. The five intensities confirmed the relationship between diesel odor intensity and odor objectionability using both a hedonic scale and direct questions. Complete operational precedures, calibration data, test results, field study data, and recommendations are included. (Author abstract modified)

20966 APTIC NO. 38789

Landau, Emmanuel

USE OF 1970 CENSUS OF POPULATION DATA FOR AIR POLLUTION RESEARCH. *J. Air Pollution Control Assoc., 21(10):614-616, Oct. 1971. 12 refs. (Presented at the American Public Health Association, Houston, Tex., 1970.)*

The 1970 Census of Population will make available a body of data which will be of considerable value in helping to assess more adequately the health effects of air pollution. Population counts by age, sex, and color make it possible to compare mortality experience on an age-specific and an age-adjusted basis centered around the census year for the more than 200 Standard Metropolitan Statistical Areas in the United States. The second type of air pollution research which is made possible relies on the use of basic demographic data supplemented by other information collected in the census on the economic and social characteristics of the population. The first type of research attempts to relate the known variation in mortality for the Standard Metropolitan Statistical Areas to differing levels of selected air contaminants. The second attempts to assess possible air pollution effects within a given urban area. Procedures used in the Buffalo and Nashville Air Pollution Studies are discussed with a view toward possible replication by other geographic areas. The need to take account of differences in socio-economic status is emphasized, as is the desirability of obtaining smoking histories. (Author introduction modified)

20967 APTIC NO. 39572

Ryan, Roberta

THE NORTHWEST ENVIRONMENTAL EDUCATION CENTER. *J. Environ. Educ., 3(2):51-55, 1971. 2 refs.*

The Northwest Environmental Education Center has proposed a plan that will make the Northwest region of the state of Washington more understandable to its teachers and students and that will identify various selected sites within the region particularly suitable for examination of specific environmental problems. Each site will be developed around a problem-solving theme, such as analysis and control of air, water, or noise pollution. A series of sites will also be selected to illustrate the progression of a particular environmental problem. Teachers from the region will receive training on how to use these sites effectively. Although the data accumulated on the Northwest region will have little value to other regions, except for comparative studies, the process is not in any way confined to regional use.

GENERAL

20968 APTIC NO. 38981

Cramer, Owen P. and Howard E. Graham

COOPERATIVE MANAGEMENT OF SMOKE FROM SLASH FIRES. *J. Forestry, 69(6):327-331, June 1971. 11 refs.*

Slash smoke plumes in western Oregon have characteristics that make them responsive to management. By controlling time, location, and quantity, logging slash outside of smoke sensitive areas can be disposed of by open burning with a minimum contribution to air pollution. This requires an effective system for matching amount of burning to dispersion potential by intensive use of weather forecasts. The result is that smoke from the generally remote, higher elevation timber lands is kept out of smoke sensitive areas. Federal, state, and private forestry agencies can effectively cooperate in preparing, administering, and submitting to a self-regulating measure in response to public opinion. (Author conclusions modified)

20969 APTIC NO. 38970

Heine, Ch.

THE ENGINEER AND THE ENVIRONMENTAL PROBLEMS. *(L ingenieur devant les problemes de l environnement). Text in French. J. Ing., 20(4):12-20, 1971.*

In Belgium, air pollution is officially defined as any emission of gaseous, liquid or solid substances, regardless of origin, which may be detrimental to human health and/or damaging to animals and vegetation. Maximum allowable concentrations are given for various pollutants. Under the responsibility of the Institut d Hygiene et d Epidemiologie, a network of over 200 sampling stations is in operation, with particular emphasis on obtaining continuous records of sulfur dioxide levels. The Federation Petroliere Belge is attempting to reduce the sulfur content in gas-oil to 0.6% and in light fuel-oil, to 1.0% by hydrodesulfurization. For smoke emissions the maximum acceptable conditions are an opacity of number 5 on the Bacharach scale and a concentration of suspended particles of 0.6 g/kcal by weight index. The many variables involved in establishing a control program are discussed including compromises required by economic considerations. Pollution from sulfur dioxide emissions can be reduced to acceptable levels by improving combustion conditions with suitable fuels, by direct or indirect fuel desulfurization, and by fuel gases desulfurization. Electrostatic precipitation can limit the concentration of dust and soot particles emitted to below 150 mg/c m flue gas. At the present state of the art, high chimneys still represent the most economic means of maintaining acceptable environmental conditions. In the meantime, intensive research and development of practical methods of fuel desulfurization of fuels continue on a world-wide scale, with pilot plants in the U. S. and Japan in the forefront.

20970 APTIC NO. 39471

McCaldin, Roy O. (ed.)

RESEARCH IN AIR POLLUTION. CONFERENCE REPORT. *Public Health Rept. (U. S.), 75(12):1173-1189, Dec. 1960.*

To further the exchange of information on current research, methods, and findings, the Public Health Service sponsored the Third Air Pollution Research Seminar held in New Orleans, La., on March 22-24, 1960. The 81 papers given at this forum are summarized. Continental and global aspects of air pollution are considered, including fluctuations in carbon dioxide concentrations. The microcoulomb ozone sensor, a new method of measuring ion mobility distribution, particle sizing, odor measurement, and various other sampling and identification procedures are discussed. Tracer techniques, dispersion phenomena, stability considerations, and other meteorological factors; and pulmonary physiology, healths effects of air pollution, and plant damage are described. Environmental levels of pollutants and toxicological studies are reported. Automotive exhaust research and other control methods are being investigated, and epidemiologic and community studies are cited.

20971 APTIC NO. 39604

Papetti, R. A. and F. R. Gilmore

AIR POLLUTION. *Preprint, Rand Corp., Santa Monica, Calif., 33p., Feb. 1971. 53 refs.*

The sources, distribution, harmful effects, meteorologic aspects, and mathematical modelling of air pollution are discussed. The most widely recognized pollutants are the familiar products of combustion: carbon monoxide, sulfur oxides, nitrogen oxides, hydrocarbons, and particulates. Forty-two types of atmospheric pollutants are currently being measured by the National Air Pollution Control Administration. The number and size distribution of atmospheric particles is established by their continual generation, transport, chemical and physical alteration, and removal. These processes cause particulate matter to maintain a fairly constant size distribution in the atmosphere, encompassing a range of diameters from about 0.001 to 1000 micron. Approximately 80 million tons of sulfur dioxide are produced globally each year. Natural sources of sulfur compounds contribute about twice as much sulfur to the atmosphere as do man-made emissions. Sources of hydrocarbons include unburned or incompletely burned fuel from automobiles and industrial processes and fuel evaporation. About 80% of the global emission of CO is attributed to the automobile. Natural processes in the ocean may account for 5% of the CO production, and warm soil surfaces may also contribute. Natural sources of metal contaminants include sea spray, windblown mineral dust, volcanic ash, and micrometeorites. The combustion products of coal and petroleum contain nickel, titanium, beryllium, tin, arsenic, vanadium, and other metals. The development of formulas for the distribution of pollutant concentrations in the atmosphere are most often focused on the simple problem of fume dispersal. Examples are presented.

20972 APTIC NO. 38993

Shiozawa, Kiyoshige

ON THE RECENT INTERNATIONAL ASPECTS OF AIR POLLUTION CONTROL. *(Taiki osen boshi taisaku o* *merguru saikin no kokusaiteki doko). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(1):33-38, Jan. 1972.*

A brief report is given of the Second International Clean Air Congress held in Washington, Dec. 6-11, 1970. Approximately 42 nations were represented by 2500 members and more than 100 individuals attended from Japan. The main topics of discussions at the congress are noted and air pollution problems in Japan are compared with those of western nations. The most serious pollutants in Japan are the combustion products of crude oil; control measures are discussed. However, suspended particulates have created serious problems in large cities and carbon monoxide is also increasing at busy urban intersections. Nitrogen oxides are increasing. Other pollutants include heavy metals such as lead and cadmium in suspended particulates, hydrogen fluoride, hydrogen chloride, nitric oxide, hydrocarbons, and odorous pollutants. In the United States, 60.6% of pollutants are caused by automobiles, 16.5% by industries, 14.1% by thermal power plants, 5.6% by heating systems, and 3.5% by incinerators. The most impressive aspects of the environmental protection activities of the United States are the large expenditures and the number of personnel, researchers, and scientists involved at all levels of government, private industry and academia. The problems in England and West Germany are similar to those of Japan, but their solution is still at the stage of high stacks. The systematic monitoring network of West Germany has much to offer to Japan.

20973 APTIC NO. 39731

Stead, Frank M.

STUDY AND CONTROL OF INDUSTRIAL ATMOSPHERIC POLLUTION NUISANCES. *Am. J. Public Health, 35(5):491-498, May 1945. 13 refs. (Presented at the American Public Health Association, Annual Meeting, 73rd, New York, Oct. 4, 1944.)*

Air pollution nuisances are caused by atmospheric contaminants of three types: inert smokes and dusts, mucous membrane irritants, and malodorous substances. Dusts rangee in size from about 1 micro to a high as 100 micron and cause definite subjective symptoms of discomfort when breathed. Mucous membrane irritants include sulfur dioxide, chlorine, phosgene, and aldehydes. Acid mists are particularly troublesome. Sources in the industrial odor field include oil refineries, soap factories, rendering plants, tanneries, and sewage treatment plants. Successful handling of atmospheric nuisance complaints requires two basic lines of action: public relations and technical study of the problem. Technical study includes the causative agent, location of dispersal points, selection of suitable sampling methods, the planning and carrying out of a sampling program, study of the physical factors affecting dilution, interpretation of the results, and securing the needed corrective measures. ½

20974 APTIC NO. 39766

Stern, A. C.

MEASURES AGAINST AIR POLLUTION. *(De bestrijding van luchtverontreiniging). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 27(5):141-146, Jan. 3, 1972. 3 refs. (Presented at the Environmental Control Seminar, Rotterdam, Netherlands, May 25-26, 1971.)*

General problems of air pollution control are outlined. Theories on the effects of increasing air pollution on the ecological system of the Earth are reviewed, with special regard to carbon dioxide and dust emissions. An air pollution monitoring network will be set up by the World Meteorological Organization. The continental character of air pollution is proved by the fact that a major part of sulfur dioxide emissions from England and West Germany are washed out over Swedish territory. This problem cannot be solved by the use of high stacks alone. Studies in the field of SO2 removal from flue gases are advanced in countries such as Czechoslovakia, West Germany, France, Japan, Romania, England, and the U.S.A. Studies on the atmospheric SO2 transfer will be coordinated by the Norwegian Institute for Air Research. Air pollution control on a national scale requires emission abatement primarily from permanent pollution sources. The interrelations between urban and non-urban emission sources are discussed. Nitrogen oxides and hydrocarbons, both necessary in definite proportions for smog formation, are supplied by urban and non-urban sources, with increased smog frequency as a result. Long-term projects for city air pollution control should reflect national and international influences as well, while short-term emergency strategies, such as those applied during periods of meteorological stagnation, should include drastic, immediate emission control. The identification of local emission sources and investigations of the traffic density may make effective pollution control on a local level possible. Instruments for the measurement of emissions from stationary sources and automobiles will acquire major importance in the near future. Principal measures and techniques applied in air pollution control are reviewed.

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*20371 APTIC NO. 39601

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